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THE ETIOLOGY AND SIGNIFICANCE OF NECROSIS (INFARCTION) OF THE PLACENTA; A BIOLOGIC AND HISTOLOGIC STUDY

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THE problems entailed in a consideration of the etiology and the significance of necrosis (infarction) of the placenta are multifold. They are closely linked to studies in embryology, physiology, and biochemistry. Our views concerning them are constantly changing as our knowledge in each branch of medical science increases.

Upon their solution a vast body of medical literature has accumulated. During the past ten or fifteen years particularly, observations and experimental studies of such pertinence have been recorded that it now appears worth while to scan them carefully, to abstract from each its bit of new information and, finally, to put the whole together and consider in what respects our understanding of the subject is to be advanced.

No space will be consumed in presenting a complete historical résumé (a task which has been ably accomplished by Hitschmann and Lindenthal, Clemenz, Williams and others) but attention will be called to the publications of recent years. Quotations will be taken only from those older contributions which are of particular significance.

Incorporated with the critical review of the literature will be found, where they appear of value, observations of our own, which are derived from the study of 400 consecutively delivered placentas.

*The papers presented in this issue of the JOURNAL were read at the Forty-third Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, which was held at Niagara Falls, Canada, on September 15, 16, and 17, 1930. Abstracts of the discussions on these papers will be published in the March issue of the JOURNAL.

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For reasons which will appear later, permission is requested to employ throughout the discourse the term "necrosis" instead of "infarction," except where quotations from others necessitate the use of the latter.

At the outset, four major problems concerning the etiology and significance of necrosis of the placenta may be tabulated:

1. The cause of the necrotic process.
2. The nature of the lesions produced and their relationship to one another.
3. The significance of hemorrhagic lesions of the placenta.
4. The relationship between toxemia of pregnancy and necrosis of the placenta.

THE CAUSE OF THE NECROTIC PROCESS

In 1921 Clemenz reviewed the literature of placental "infarction" and presented a number of reasons why the term "white necrosis," which he originally gave to the lesions in 1894, was still applicable. In the course of his paper, he discusses four basic theories of the formation of placental necrosis.

The four theories discussed by Clemenz still have their various exponents in the literature today, and may, therefore, again be used as a basis of an investigation into etiology. They are as follows:

1. Alteration of the structure of villous vessels.
2. Inflammation of the placenta.
3. Changes in the decidua and its vessels.
4. Coagulation of intervillous blood upon degenerated syneytium.

Clemenz attributes to Ackermann the origin of the name "infarction." Ackermann, Hoffman, and others ascribe the lesions to obliterative changes in the villous vessels and consider the degeneration of the syneytium and stroma as secondary.

This theory of the etiology of placental necrosis has remained deeply rooted in medical literature and teaching. Eden speaks of the "senile" changes in the placenta, the peri- and endarteritis of placental vessels, which produce "infarction" in that organ. Williams, in his various treatises on the subject, emphasizes the predominance of placental vessel change as a causative factor, but admits of the possibility of other influences, such as decidual lesions, effecting certain of the placental "infarcts."

Even those writers of recent years who attribute placental infarction to other causes are loath to repudiate completely the possibility that certain types of lesion may be due to endarteritis of placental vessels (Siddall and Hartman, Browne, McNally, Adair, McNally and Dieckmann).

Fraser attributes the alterations of the vascular tree of the "infarcted" placenta, as he observes them in roentgen-ray studies, to senile vascular changes, e.g., endarteritis and periarteritis.

On the other hand a number of observers vigorously oppose this view. Hitsehmann and Lindenthal failed to observe the process of endarteritis in the placenta except in those specimens where the placenta is the site of syphilitic disease. In addition, they are of the opinion that the villous stroma and syneytium are not nourished to any extent by the villous capillaries. Clemenz is in full accord with their views. Straehan fails to find sufficient evidence of placental vessel change to explain the formation of "infarcts."

Young presents several reasons for believing that the nourishment of the villous syneytium comes from the maternal intervillous circulation and not from the fetal:

First.—That during the early stages of the development of the embryo, when the chorionic epithelium is growing, and extending rapidly, the stroma of the villi contains no fetal vessels.

Second.—In the case of hydatidiform mole and particularly of chorionepithelioma, where the chorionic epithelium is hyperplastic, few vessels are found in the mesoblastic core.

Third.—Fragments of undegenerated syneytium have been found in various organs of the pregnant woman. Such fragments transported by the maternal blood stream have maintained their vitality despite their detachment from the placental villi.

Fourth.—In ectopic pregnancy, undegenerated fragments of syneytium and villous stroma may be found, detached from the ovum, in the wall of the tube.

Fifth.—The fibrosis of the stroma and reduction of the caliber of the villous capillaries in syphilis of the placenta, do not give rise to necrosis of the overlying syneytium.

On the basis of our observations, we, too, are opposed to the theory that alterations of the villous vessels produce necrosis of the placenta. In the first place, we fail to find endarteritis of placental vessels except in fully developed syphilis of the placenta, and when this disease is present there appears to be no greater tendency to necrosis. (Fig. 10.)

In other nonsyphilitic specimens, necrosis is singularly wanting where diffuse fibrosis of the villous stroma has practically obscured the villous capillaries. (Fig. 11.)

Constantly we find villi in which the normal capillaries are distended with undegenerated blood, but around which degeneration of the syneytium and deposit of fibrin is present. (Fig. 1.)

We are of the opinion that any theory is contrary to the biologic nature of the development of the fetus in utero which pictures senile changes originating on the fetal side of the placenta. One does not find an organism so distinctly anabolic in its nature as the fetus initiating obliterative changes such as endarteritis in the vessels of its sole organ of nutrition and respiration.

We find in the placenta no type of histologic disturbance, and in the literature no proof, which justifies acceptance of the villous vessel origin of "infarcts."

The idea that the peculiar indurated areas of the placenta are the result of local inflammation of the organ was one of the first theories suggested. It is attributed by Clemenz to Maurieau and Morgagni.

This explanation, draped in some modified form, reappears not infrequently in the literature today. Talbot in a clinical study of the placenta attributes the cause of necrosis to focal infection in other parts of the body. He believes that hematogenous transportation of bacteria produces thrombosis of uterine blood sinuses, as a result of which corresponding portions of the placenta are cut off from nutrition and undergo necrosis. His statement that "placental infarcts give more positive evidence and of greater value than blood culture methods of the presence of bacteria in the blood stream" is not supported by convincing evidence, however.



Fig. 1.—Focal necrosis of placental villus. Fibrin deposit (F) surrounding a villus in which the villous capillary (V) is distended with undegenerated fetal blood. The syncytium has disappeared. ($\times 230$)

Our histologic studies convince us that the appearance of necrotic lesions of the placenta fails to reveal any evidence of inflammatory reaction. Leucocytie infiltration of the lesions is rare.

In addition, the actual lesions of acute inflammation, which we observe in ten per cent of consecutively delivered placentas, bear no apparent relationship to the occurrence of placental "infarcts." Chronic inflammation of the placenta, as observed in fully developed syphilitic disease, is not associated with greater tendency to "infarct" formation.

The effect of thrombosis of the decidual arteries will be considered at once.

The part played by disturbances of the decidual vessels in the etiology of "white necrosis" is dwelt upon by Clemenz in his first paper

(1894). At that time he believed that obstructive lesions of the decidual arteries caused necrosis of that portion of the placenta which the vessels normally supplied with maternal blood. Although Clemenz himself apparently abandoned this theory later (1921), his original concepts are, nevertheless, frequently quoted and relied upon by subsequent observers.

We have just noted how Talbot combines this theory with the idea of focal infection as a foundation of his explanation of the inflammatory origin of "infarction."

Young attributes practically all "infarcts" to decidual vessel change, stating that when the maternal blood supply is inadequate the syncytium of the villus undergoes necrosis and fibrin is deposited in the intervillous space.

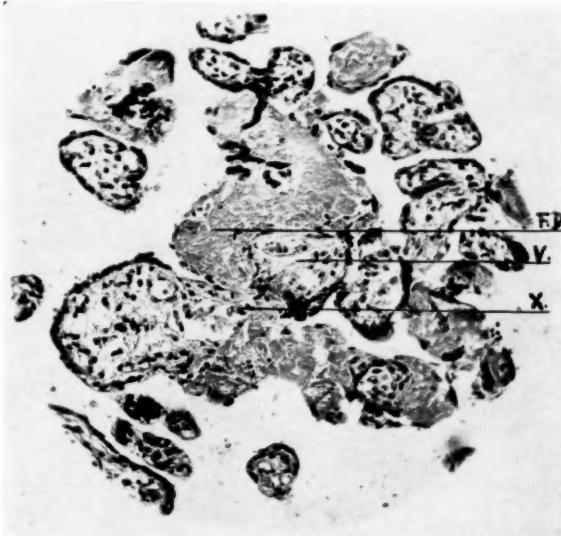


Fig. 2.—Focal necrosis of placental villi. Bridge of fibrin deposit (F.D.) which extends from the degenerated syncytium of one villus (V) to another. At one point (X) fetal blood is apparently discharging from an aperture in the capillary wall. ($\times 230$)

Siddall and Hartman consider thrombosis of the uterine blood sinuses the cause of blood stasis and thrombosis in the intervillous spaces.

Williams resorts to the original theory of Clemenz to explain the origin of certain "infarcts" which reveal upon histologic study closely matted necrotic villi unassociated with fibrin deposit.

McNally expresses his agreement with the view of Young (and therefore of Clemenz). He states further that interference with the arterial blood supply generally gives rise to nonfibrinous infarcts, while interference with the venous drainage causes stagnation and back pressure of blood and results in the formation of intra- or retro-placental hematomas.

Certain considerations make this theory of etiology appear illogical. In the first place, while acknowledging that thrombosis of the uterine sinuses may be present before the onset of parturition, we feel that the extent to which it occurs has been exaggerated. That during pregnancy such thrombosis is sufficiently extensive to cause interference with the nutrition of corresponding areas of the placenta is extremely doubtful.

In a histologic study of fifty parturient uteri removed at time of section, Williams is not impressed with the frequency or extent of thrombosis of the sinuses at the placental site.

Recent investigations of the character of the intervillous spaces and intervillous circulation, by Runge and Hartmann, Franken, Grosser,

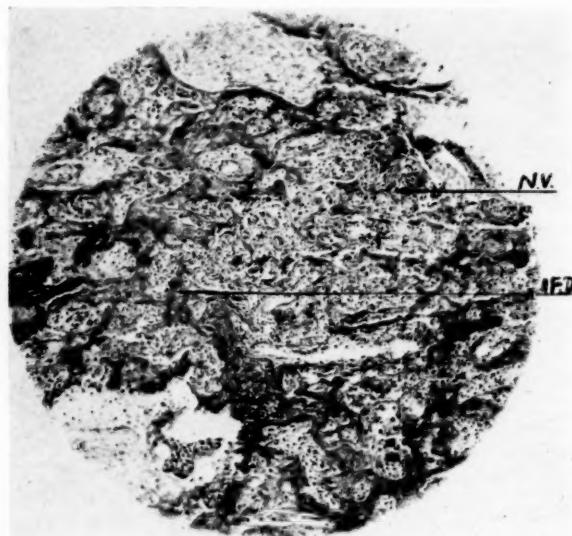


Fig. 3.—Conglomerate necrosis of placental villi. Fully developed necrotic lesion revealing necrotic villi (N.V.) and intervillous fibrin deposit (I.F.D.). ($\times 92$)

suggest that even though one or more decidual vessels are obstructed the entire placenta will nevertheless be adequately supplied with blood.

These investigators show that the decidual arteries traverse the decidual pyramids or septa to a point underneath the fetal surface where the arterial blood is discharged into a subchorionic space which communicates freely between the villous stems. The blood then flows from the fetal toward the maternal surface of the placenta, pervading with slowly moving current the intricacies of the intervillous spaces. At the maternal surface it is collected by the decidual veins. (Fig. 12.)

In view of the intercommunicating nature of the subchorionic space and of the intervillous circulation, it appears unlikely that obstruction of a decidual artery can cause necrosis of a contiguous portion of placental tissue. An exception to this statement follows:

The margin of the placenta which frequently reveals necrosis, as evidenced by atrophied villi and collapsed vessels, represents the transitional zone between the chorion frondosum and chorion laeve. The process of necrosis in this zone may be attributed to deficiency of the maternal blood supply from an area where the vascular decidua basalis passes over into the avascular decidua capsularis. The process here, however, is largely developmental in origin. (Fig. 9.)

The fourth theory of "infarct" formation points to necrosis of the syneytium of the villi and deposit of fibrin in the intervillous spaces as the primary etiologic factors.

Hitschmann and Lindenthal deserve the credit for advocating this theory in their excellent contribution and for describing with such exactitude the step by step development of the necrotic lesions of the placenta.

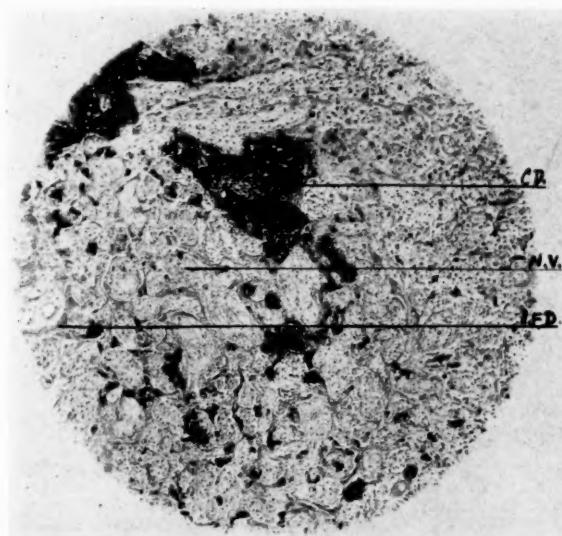


Fig. 4.—Conglomerate necrosis of placental villi with calcareous deposits. Fully developed necrotic lesion revealing necrotic villi (N.V.), intervillous fibrin deposit (I.F.D.), and calcareous deposit (C.D.). ($\times 69$)

Anatomic and physiologic considerations, as well as subsequent experimental studies, indicate that their conclusions are logical and correct. On the basis of our own observations we are in agreement with their reasoning.

What uncertainty they expressed as to whether the necrosis of the syneytium or the deposit of fibrin in the intervillous spaces is primary is now banished.

In addition, we believe that it is now possible to go further and state that a constituent or constituents of the maternal blood are responsible for degeneration of the villous epithelium, and that this process is the first step in the formation of necrotic lesions of the placenta.

For a proper understanding of this explanation of "infaret" formation one must hold in mind certain considerations. First, that while the intervillous spaces are in free communication with the maternal vessels and that although the syncytium serves the purpose of a vascular endothelium, yet this syncytium is epithelial and fetal in origin. It is in a sense foreign to the normal independent life of the host.

It is a tissue which, particularly in its early life, bears many of the characteristics of malignancy (Bell). The invasive character of the young chorionic epithelium represents the desperate effort of the fertilized ovum to secure nutrition for itself. From the first the maternal organism is on constant guard against over-invasiveness of this tissue.

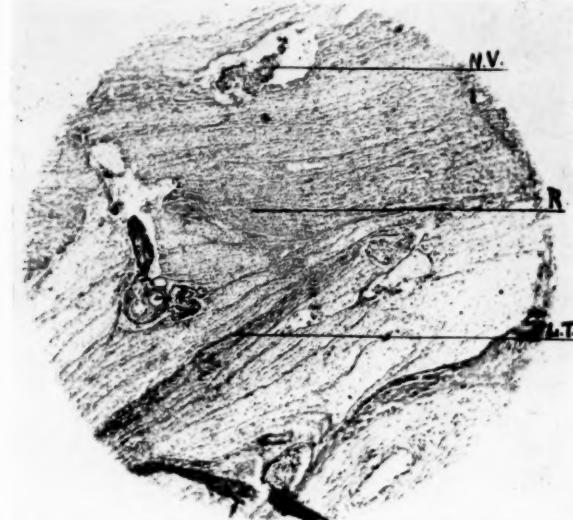


Fig. 5.—Laminated intervillous thrombosis. Blood coagulated in the intervillous space in layers (L. T.). The red blood cells (R) are still visible among the meshes of fibrin. Occasional necrotic villus (N.V.) present. (X69)

It might be said that the fetal chorionic epithelium is the one type of malignant growth against which the human host *usually* develops a mechanism of resistance. (This may break down, as in chorionepithelioma.)

During the early growth of the ovum, the decidua appears to serve this purpose of defense. At the line of contact of chorionic epithelium and decidua a "melting down" of tissue (the fibrin layer of Nitabusch) develops.

As the growth of the embryo continues the property of resisting the growth of fetal epithelium is apparently conferred upon the maternal blood, for Langhans layer gradually disappears and toward the latter part of pregnancy the syncytium degenerates.

Hitschmann and Lindenthal call attention to the fact that as the regressive changes in the chorionic epithelium increase, necrotic and

"infareted" areas occur more frequently in the placenta. While only small and occasional areas of necrosis are to be found in the placenta at sixteen weeks, at full term the lesions are frequent and often extensive.

When one undertakes to consider the actual constituent of the mother's blood which produces necrosis of the syneytium, he must delve considerably into the field of conjecture.

Many substances which appear to have a rather specific effect on the chorionic epithelium have been employed experimentally to produce such lesions in animals.

W. Blair Bell, and his associates, demonstrate the "specific" action of lead on the chorionic epithelium of the rabbit in contrast to the

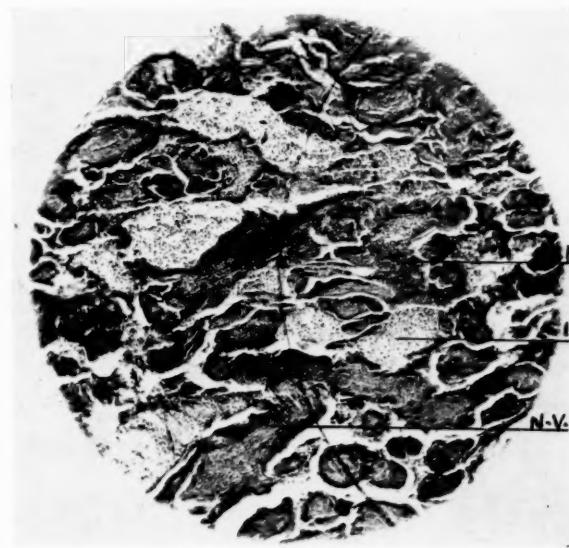


Fig. 6.—Old necrotic lesion. Beginning disintegration and absorption of fibrin deposit (F) between the necrotic villi (N.V.) leaving a fine intervillous recticulum (I). ($\times 69$)

effect of certain other metals. The frequency of occurrence of abortion when pregnancy is complicated by lead poisoning is well known.

Datnow presents an experimental investigation concerning toxic abortion as produced by various chemical agents.

In his experimental studies on the toxemias of pregnancy Hofbauer describes the degeneration of the chorionic epithelium and the degeneration of other viscera produced by histamine.

Francis J. Browne, in his experimental investigations into the etiology of accidental hemorrhage and placental infarction, is impressed by the degenerative changes induced in the chorionic epithelium by some toxin present in the blood of chronic nephritis.

Robert A. Johnson and his associates emphasize the degenerative effects of tyramine on certain viscera.

Whether such reactions are "specific" or whether the chorionic epithelium being embryonic in origin is more susceptible to toxic material than the maternal tissues remains to be shown. Many of the materials employed in these experiments are entirely foreign to the normal maternal circulation. In the case of others, it is questionable whether they are present in sufficient quantity to be of importance.

The constant finding of necrosis of the chorionic epithelium in all the placentas examined indicates that the process is a physiologic one. In view of what has been said of the invasive character of the chorionic epithelium and the necessity of the mother developing some mechanism of defense, it appears probable that ferments which are formed by the maternal tissues during the course of pregnancy, and transported by the maternal blood, cause the degeneration of the syncytium.

It is also highly probable that such abnormal conditions as insufficient ferment production or excessive ferment may lead respectively to such pathologic results as chorionepithelioma or widespread necrosis of the placenta.

THE NATURE OF THE LESIONS PRODUCED AND THEIR RELATIONSHIP TO ONE ANOTHER

The process of necrosis of the placenta appears to take place in the following manner.

As the degeneration of the syncytium advances all evidences of nuclei disappear from its protoplasm; the protoplasm itself becomes extremely attenuated until defects in the continuity expose the stroma of the villus. Blood platelets attach themselves to the exposed surface and fibrin is gradually deposited from the passing current of maternal blood.

The accumulating fibrin deposit soon surrounds the involved villus and frequently extends to adjacent villi. At this stage the microscopic picture reveals a single villus surrounded by fibrin, or adjacent villi joined together by fibrin. (Fig. 2.) When the process observed is recent the villous stroma may appear unaffected and the villous capillary distended with normal undegenerated fetal blood. Very soon, however, the stroma undergoes hyaline degeneration and the villous capillaries collapse. To such a lesion the term "focal necrosis of placental villi" is applicable.

A few necrotic villi connected by fibrin bands form the nucleus for more rapid growth of the lesion. Further intervillous fibrin deposit welds together large groups into a conglomerate mass. The individual villi in such a mass, deprived by encircling fibrin deposit of nutrition from the maternal blood, promptly undergo degeneration.

At this stage in the process the lesion is fittingly termed "conglomerate necrosis of placental villi." (Fig. 3.) Areas of conglomerate necrosis appear macroscopically as light grey nodules in the substance of the placenta.

When masses of necrotic villi lie adjacent to one another they obstruct the stream of maternal blood as it flows through the intervillous spaces of the placenta from the fetal to the maternal surface. In addition, fibrin ferment is constantly discharged from the degenerated tissue.

The combined effect of these two factors, stasis and fibrin ferment, is to produce in many instances extensive intervillous thrombosis of maternal blood. The thrombosis generally takes the form of lamina imposed upon the obstructing villi.

In recent thrombosis the red blood cells are entangled in the meshes of fibrin. As time goes on the red blood cells disintegrate and are absorbed. This accounts for the appearance of what have commonly

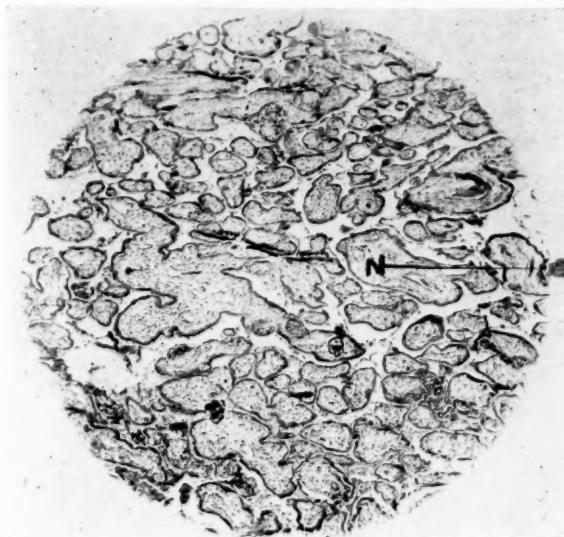


Fig. 7.—Old necrotic lesion. Further disintegration and absorption of intervillous fibrin leaving necrotic villi (N) and the appearance of a nonfibrinous lesion. ($\times 57$)

been called "red" and "white infarcts" respectively. We have chosen to call such a lesion "conglomerate necrosis of placental villi with extensive intervillous thrombosis" (Fig. 5).

Long-standing areas of necrosis may undergo certain alterations. The first and most common of these is the disintegration and absorption of the red blood cells, which has just been mentioned, and which alters the color of the lesion from red to white.

The second and not so commonly observed change is the disintegration and absorption of the intervillous fibrin deposit, which leaves pale, closely matted necrotic villi (Fig. 7). The tissue appears mummified. Grossly such areas appear lighter in color than the average lesions and contracted below the general surface of the placenta.

Siddall and Hartman describe such a lesion as the latter but attribute it to the massive obstruction of a villous stem vessel. McNally

believes such "non-fibrinous infarcts" are the result of obstruction of a decidual artery. Williams is of the opinion that such areas represent a very early stage of "infarction" and may be due to faulty decidual blood supply to the part.

We believe, however, that this lesion is an old one and is derived in the manner described. This opinion is supported by the fact that in extensive areas of necrosis we find stages of transition to this condition, and that even where the fibrin is absorbed the fine intervillous reticulum of previous thrombosis is usually retained.

The third change in old necrotic lesion, one which is infrequently observed, is the autolysis of the center of the necrotic mass with the formation of a placental "cyst."

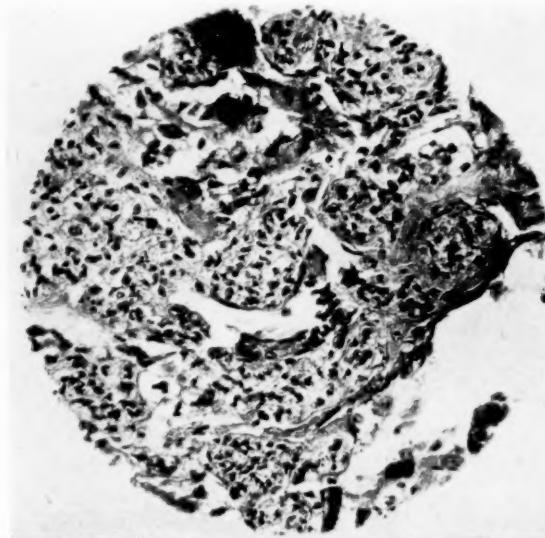


Fig. 8.—Old necrotic lesion undergoing organization (?). Rare process; questionable in this case whether process of organization actually involves the intervillous fibrin deposit. ($\times 276$)

The fourth alteration, and one which is rarely found, is the invasion of the tissue with monocytes and the beginning of organization. (Fig. 8.)

From time to time in the course of our histologic studies, we have observed what appeared to be an outpouring of fetal blood through an aperture in the wall of the villus. This condition was noted particularly in areas where the syncytium was quite attenuated and in close contact with the endothelium of the villous capillary.

In our early studies, we were rather overimpressed with the significance of this phenomenon, thinking that extravasation of fetal blood might play an important part in the formation of extensive intervillous thrombi.

Further observations have convinced us that this is extremely unlikely. In the first place rupture of the small villous capillary alone

would liberate insufficient volume of blood to produce such large thrombotic areas. Also it appears unlikely that a central nidus of hemorrhage discharging blood into the spaces about itself could produce the peripheral extension which is characteristic of intervillous thrombosis.

In view of the studies of Allen and of Ohnesorge on the question of the isoagglutination reactions of fetal and maternal blood, it appears unlikely that the occasional isoagglutination reaction of fetal red blood cells which may escape from villous capillaries is productive of local pathology or of systemic reaction.



Fig. 9.—Marginal necrosis of placenta. Area in which necrosis is apparently result of inadequate decidual blood supply, revealing necrotic villi (N.), intervillous fibrin deposit (I.), and collapsed placental vessels (P.). (X57)

THE SIGNIFICANCE OF HEMORRHAGIC LESIONS OF THE PLACENTA

Frequently confused with large areas of necrosis of the placenta are certain true hemorrhagic lesions, or intraplacental hematomas. These are described in an excellent contribution by McNally and Dieckman, in which the successive changes in appearance from red to white are set forth. These investigators class all red "infarcts" as hemorrhagic in nature. With this viewpoint we differ, for there are many red lesions of the placenta in which the color is due not to hemorrhage but to the recent thrombosis of intervillous blood against obstructing patches of necrotic villi.

From our observations, we are of the opinion that hematomas of the placenta are a distinct entity from "infarction" of the placenta. Their formation results from the rupture of a placental vessel of sufficient size to cause a rapid extravasation of blood. Inasmuch as there is a dual blood flow, fetal and maternal, through the placenta, there are two possible sources of such hemorrhage.

Hemorrhage which results from the rupture of large vessels of the fetal circulation appears to be rare; it has never been our privilege to observe it. Klaften gathers several cases from the literature which he believes are authentically of this type. In the majority of these the hematoma was found in the subamniotic tissue of the placenta. In each case mentioned there was a history of violent abdominal trauma.

The vast majority of placental hematomas are of maternal vessel origin. Upon a consideration of recent studies of decidual and intervillous circulation (Grosser, Franken) (Fig. 12), the mechanism of formation of intraplacental hematomas is clarified. The fact that the decidual arteries follow the course of the decidual pyramids well into the thickness of the placenta makes possible the rupture of such vessels into the substance of the placenta.



Fig. 10.—Section from syphilis of placenta. Diffuse fibrosis (D) of large placental villi resulting in reduction of the caliber of the villous capillaries (V). Singular absence of necrosis of villi. ($\times 92$)

Upon rupture of such a vessel the effect is quite in contrast to the normal condition by which blood oozes from the arterial terminals into the subchorial blood lake. Blood in large quantities and under considerable velocity discharges from a relatively large vessel into the placidly moving current of the intervillous spaces. The local intervillous circulation is incapable of coping with such a sudden extravasation. The placental villi are pushed asunder and the blood accumulates in an area surrounded by the compressed villi. Coagulation starts at the periphery and forms, with the peripherally displaced villi, a pseudo-capsule.

Such hematomas appear macroscopically as dark red encapsulated lesions of more or less circular outline. As the red blood cells dis-

integrate and disappear streaks of white traverse the cut section, and eventually such areas are converted into a firm white collection of fibrin alone.

As Williams states, hematomas are particularly common in the placentas of patients who have suffered with nephritie toxemia during pregnancy; in well-marked cases the organ presents the appearance termed "placenta truffe."



Fig. 11.—Fibrosis of placental villi and of placental vessels. Section reveals increased density of villous stroma (D) at expense of the villous capillaries (V) and increased thickness of the walls of the placental vessels (F). Singular absence of necrosis of villi. ($\times 92$)

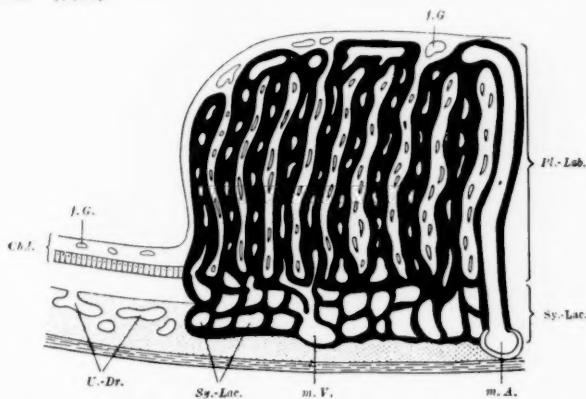


Fig. 12.—Diagram of maternal circulation through the placenta (from Grosser). The maternal blood flows through the intervillous spaces from the fetal toward the maternal surface. Decidual artery (m.A.) traversing decidual septum to fetal surface. Decidual vein (m. V.) collecting blood at maternal surface.

The association of intra-placental hematomas with uteroplacental apoplexy is frequently observed, particularly in cases of nephritie toxemia. The processes of formation of these two lesions appear to have much in common.

Francis J. Browne in his experimental investigations into the etiology of accidental hemorrhage and placental "infarction" attributes the occurrence of such lesions to the action of an "endothelial toxin" which he believes is present in the blood of nephritic patients.

He, too, emphasizes the similarity in the mechanism of production of intraplacental hematomas and of uteroplacental apoplexy, stating that the "endothelial toxin" may act on the decidua vessels either as they traverse the placenta or as they pass through the decidua basalis, or upon the endothelium of the uterine blood sinuses. That such a toxin is present in the blood of nephritic patients is possible, but remains to be proved; on the other hand, the high blood pressure alone of the nephritic patient may be a sufficiently effective force to cause rupture of the decidua vessels which are of recent and delicate formation.

THE RELATIONSHIP BETWEEN TOXEMIA OF PREGNANCY AND NECROSIS OF THE PLACENTA

The observations just recorded lead to a brief consideration of the relationship between placental necrosis (infarction) and the toxemia of pregnancy. The literature concerning this important phase of the question is greatly confused; a confusion that has in no way been relieved by the hypothesis presented by James Young, in 1926, that the products of "infarction" are causative of toxemia.

To this proposition we advance with favor the vigorous protest of Paramore, who states, "Young's conception that it is the placental change which causes eclampsia is put out of court by many considerations, for instance, by the commonness of placental infarcts without 'toxemia,' and the occurrence of marked 'toxemia,' even fulminating eclampsia, without apparent placental change."

As to the rôle played by toxemias in the production of necrosis of the placenta, no authoritative conclusion can be drawn until the nephritic patients are considered separately from the preeclamptic-eclamptic group, and until the necrotic lesions of the placenta are differentiated from the hemorrhagic.

On the basis of our observations we are in complete agreement with Williams, who states that he finds no increased tendency to "infarct" formation in the placenta of eclamptic patients. Haffner presents conclusions of a similar nature.

The lesions which Browne finds in the placentas of animals in which he experimentally produces nephritis partake primarily of a congestive and hemorrhagic nature. He states that they do not resemble the physiologic lesions of "infarction," such as are described by Eden and others.

We are of the opinion that the process of necrosis of the placenta is physiologic and that it is not produced by, nor productive of the late toxemias of pregnancy. We believe that hemorrhagic lesions (hematomas of the placenta) are, however, lesions of a different charac-

ter and etiology; they are found most frequently associated with, and are apparently caused by nephritis toxemia. They are produced by much the same mechanism as is utero-placental apoplexy.

THE TERM "NECROSIS" MORE APPROPRIATE THAN "INFARCTION"

Clemenz insists that the title "neerosis" of the placenta is alone applicable to these degenerative lesions. With this we agree to a considerable extent, although finding no reason to limit the term to "white neerosis."

It is not to be denied, however, that in the fully developed lesions certain points common to infarction are to be found (MacCallom). This is particularly true, in that intervillous thrombosis prevents the maternal blood from reaching the villi and causes their death by starvation.

Nevertheless, the process of formation is not similar to that of infarction in other organs and the use of the term "infarction of the placenta" immediately suggests an embolic phenomenon, which is a gross misconception.

The title "neerosis of the placenta" indicates more aptly the origin of the lesion in the initial degeneration of the syncytial covering of the placental villi. For this reason we strongly recommend its employment.

SUMMARY

In a brief summarization of our studies we would emphasize the following points:

1. Neerosis of the placenta is a physiologic phenomenon and is found to some degree in every full-term placenta.
2. The process is initiated by degeneration of the syncytium and deposit of fibrin in the intervillous spaces.
3. It appears likely that during pregnancy ferments are formed by the maternal tissues as a protection against the invasive character of the chorionic epithelium, and that these ferments, as constituents of the maternal blood, cause degeneration of the syncytium.
4. The successive stages in the progress of neerosis of the placenta are: "focal neerosis of placental villi," "conglomerate necrosis of placental villi," "conglomerate necrosis of placental villi with extensive intervillous thrombosis."
5. Long-standing areas of neerosis may undergo the following alterations:
 1. Disintegration and absorption of the red blood cells, which alters the color of the lesion from red to white (common).
 2. Disintegration and absorption of intervillous fibrin deposit leaving pale, closely compacted, necrotic villi (not uncommon).
 3. Autolysis and cyst formation in the center of the necrotic tissue (infrequent).
 4. Invasion with monocytes and beginning organization of tissue (rare).
6. Hematomas of the placenta are not of the same nature as the necrotic lesions of the placenta. Hematomas result from the rupture of

decidual arterioles. They occur most frequently when pregnancy is complicated by chronic nephritis. Their etiology and mechanism of formation are similar to that of uteroplacental apoplexy, and the two lesions may be found in the same placenta.

7. Necrosis of the placenta is found no more frequently in toxemia of pregnancy than in normal pregnancy. There is insufficient evidence for the statement that "infarcts" of the placenta cause toxemia of pregnancy.

Hemorrhagic lesions (hematomas) of the placenta, however, are associated with nephritic toxemia.

8. The term "necrosis" is preferred to "infarction" because, as has been demonstrated, the process begins with small areas of tissue death rather than with obstruction of circulation.*

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MANAGEMENT OF THE THIRD STAGE OF LABOR WITH SPECIAL REFERENCE TO BLOOD LOSS

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the University of Minnesota, and the University of Iowa)

IN A PRELIMINARY report by one of us (AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY 17: 578, April, 1929) the "Blood Loss in the Third Stage of Labor," was analyzed with the idea of determining what clinical factors had a bearing in determining the amount lost in each given case. This analysis proved very suggestive but was not entirely conclusive because of the small size (868 cases) of the series available for study. The present paper is the result of a similar analysis of¹ some 3000 cases from the University of Minnesota and² 1200 private patients from the Henry Ford Hospital, along with³ some 1400 cases from the University of Virginia and the University of Kansas. These three series provide a total of 5600 cases and offer an opportunity for comparative analyses between clinic and private practice, as well as between two different teaching clinics where there exist certain differences in types of material and also certain differences in technie.

Two simple methods of analysis are employed in this study. Each of these methods was applied separately to each of the three series of cases. No attempt was made to analyze the composite group of 5600 because of the character of the material. A series of private cases, with expert attendants, would obviously present a different picture from a group of clinic cases routinely attended by interns. Likewise the University of Minnesota Clinic differs essentially from that at Virginia and Kansas. At Minnesota the routine attendants at deliveries are the intern and the junior Teaching Fellow, and the patients are largely white and Scandinavian. At Virginia and Kansas the routine attendants are the intern and a visiting man or senior resident, and there is a considerable admixture of colored patients along with a white stock of somewhat smaller stature than the Scandinavian.

The first method of analysis was to graph blood loss against each of the clinical factors studied. In every instance blood loss was plotted, as ordinate, against the factor being studied, as abscissa. Average points only were plotted as it was felt that field graphs would not add materially to the value of the study. No attempt was made to smooth out any of the resulting curves. They are presented as broken lines.

The second method of analysis was the same as that employed in the preliminary report, namely Pearson's Coefficient of Correlation. This

latter method is superior to the former in that it shows much more definitely the exact relationship present but it does possess the disadvantage of not being quite as readily understood, as, so far, it has not been widely used in medicine. On the whole, the results obtained with these two methods of study are almost identical. They therefore corroborate one another and, for our present purposes, enable us to draw somewhat more definite conclusions.

AGE OF THE MOTHER

Fig. 1 shows the resulting curves from plotting blood loss in cubic centimeters against age of the patient (in three-year intervals) in

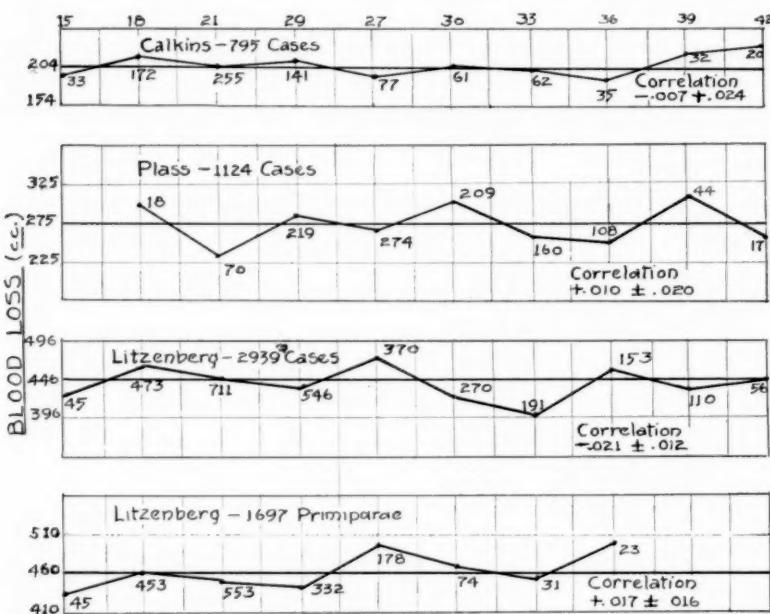


Fig. 1.—Showing age of mother.

each of the three series. Because of the fact that patients in the younger age groups are almost all primiparae and the patients in the older age groups are almost all multiparae, and considering that blood loss in primiparae is slightly greater than that in multiparae, it was thought advisable to plot a fourth curve covering primiparae only, in order to remove the differential of parity from the analysis of age. The coefficient of correlation accompanies each graph and it may be noted that absolute agreement exists between the graph and the coefficient in each case. Each graph is a flat line with no tendency to increase or decrease as one passes from the younger to the older age groups. Each coefficient is essentially zero and in no instance is it materially more than its probable error. It is quite evident that age of the patient has no effect on the amount of blood lost.

PARITY

Certain errors in copying clinical histories of the Plass group prevented the analysis of parity in that series. Only two curves and their corresponding coefficients are therefore available for study. The curves present the same characteristics as those on age, in that there is no definite tendency toward increase or decrease in the blood loss as one passes from the first to the tenth pregnancy. There were not sufficient numbers of cases to enable us to analyze parity beyond the tenth pregnancy. The coefficients are slightly higher, seeming to indicate a decrease in blood loss with increasing parity. This tendency as shown by the coefficients is very small. Feeling that it was probably limited

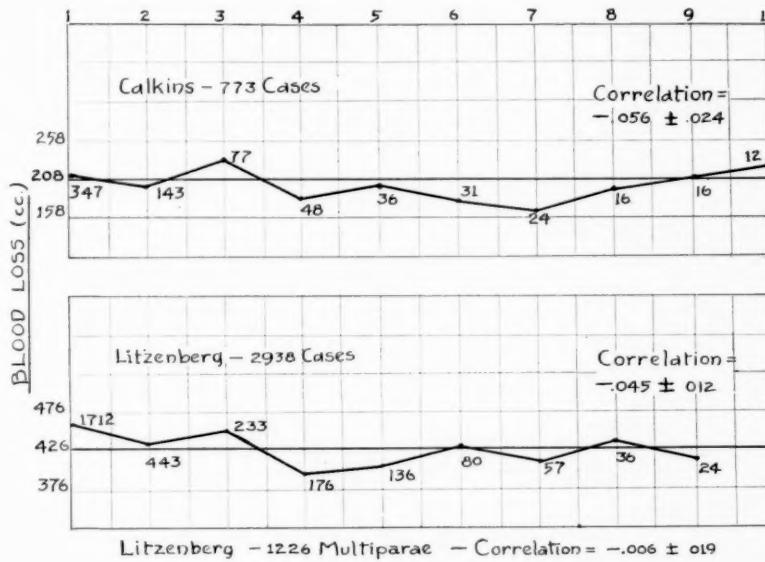


Fig. 2.—Showing parity of mothers.

to the decrease between gravida one and gravida two (note the comparatively large number of cases in each of these two groups) the coefficient for the 1226 Minnesota multiparae was also determined. It proved to be zero, thus establishing clearly what seemed to be true from inspection of the graphs alone and bringing the coefficients and graphs once more into perfect agreement. (Fig. 2.)

This difference in blood loss between the first and subsequent labors is really quite small and actually proved to 33 e.e. in the Litzenberg series and 12 e.e. in the Calkins series. These amounts are well within the difference between a first degree and second degree laceration (41 e.e.) as mentioned in the preliminary report. They are, therefore, to be explained on the basis of greater frequency of laceration in the primiparae. Remembering, then, that there may be some extra bleeding

from lacerations in the primiparae one can safely draw the conclusion that, in other respects, parity has no effect on blood loss.

LENGTH OF LABOR

First Stage (Fig. 3).—Analysis of the length of the first stage of labor in three-hour intervals showed curves and coefficients with very slight or no tendency toward increase in blood loss in the longer labors. In the Calkins and Litzenberg series both the curves and the coefficients indicate a very slight tendency toward increase. This is not true in the Plass series as the curve is flat and the coefficient is less than twice its probable error. This tendency, if present, is so small that it cannot

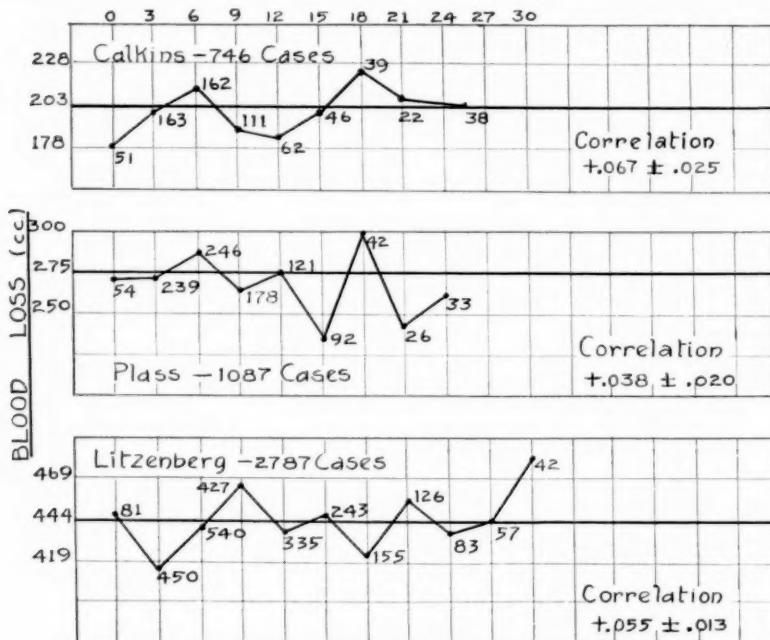


Fig. 3.—Showing length, in hours, of first stage of labor.

possibly have any bearing determinable in the individual case. One may, therefore, draw the conclusion that the length of the first stage of labor has no appreciable effect on the blood loss of the third stage.

Second Stage (Fig. 4).—The tendency toward upward inclination of the blood loss in the cases with a longer second stage of labor is somewhat more evident than was true of the first stage. Looking at the curves as a whole, however, this tendency is not very marked. The coefficients, with the exception of the Calkins series, are not large. When one recalls that forceps delivery with its frequent episiotomy or second degree laceration is much more common with a long second stage than with a short one and then remembers that operative delivery materially increases the blood loss this upward tendency in the curves

becomes of little significance. The *average increases* in blood loss from forceps delivery and from lacerations are shown in Table I.

TABLE I

	CALKINS	PLASS
Low forceps	90 e.e.	
Median forceps	230 e.e.	{ 100 e.e.
First degree laceration	none	45 e.e.
Second degree laceration	40 e.e.	70 e.e.
Episiotomy	70 e.e.	55 e.e.

When one analyzes spontaneous deliveries separately one finds no definite tendency toward increased blood loss with prolongation of the second stage (coefficient is $+.060 \pm .032$). It is probably safe to conclude

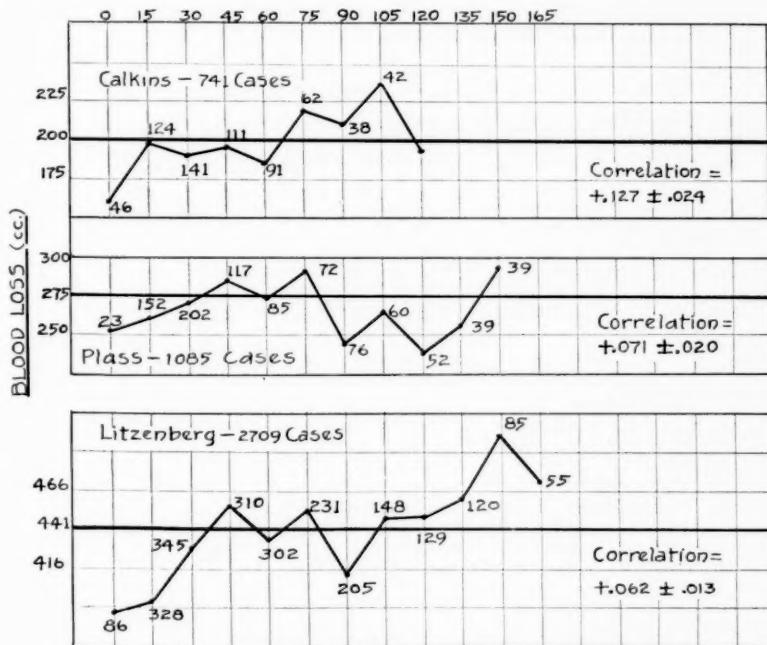


Fig. 4.—Showing length of second stage, in minutes.

that the length of the second stage of labor (without operative interference) has no particular effect on the blood lost. This is certainly true as far as application to the individual case is concerned.

Third Stage (Fig. 5).—Here we find a very definite tendency toward increased blood loss with the longer durations of this stage of labor. This tendency is evident in each of the three curves and also in each of the three coefficients. In the Litzenberg series the increased blood loss amounts to about 150 e.e. for a forty-minute third stage as against a real short third stage. The coefficients vary from five times the probable error in the Calkins series to eleven times the probable error

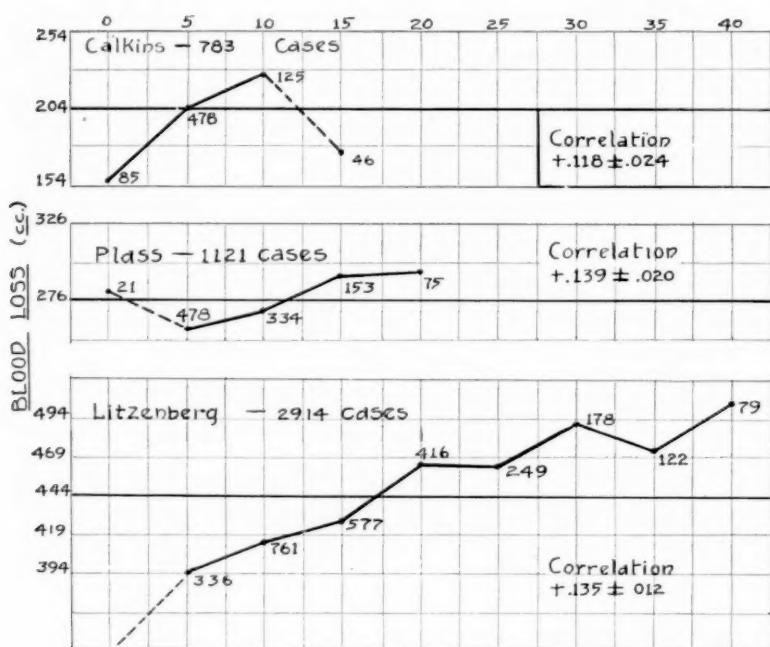


Fig. 5.—Showing length of third stage, in minutes.

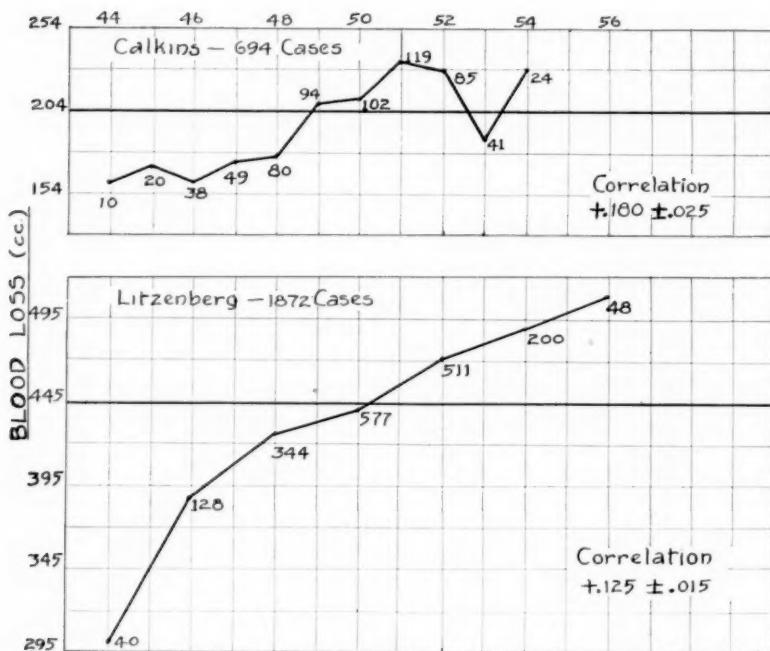


Fig. 6.—Showing height of child in centimeters.

in the Litzenberg series and are all well over $+.100$. This tendency toward increased blood loss with prolongation of the third stage is sufficiently definite to make itself felt in a practical way in the individual patient. One may find, of course, numerous exceptions but they are not sufficiently frequent to disprove the general statement. Moreover, good management of a prolonged third stage can nullify, and, no doubt, frequently does prevent the occurrence of excessive blood loss

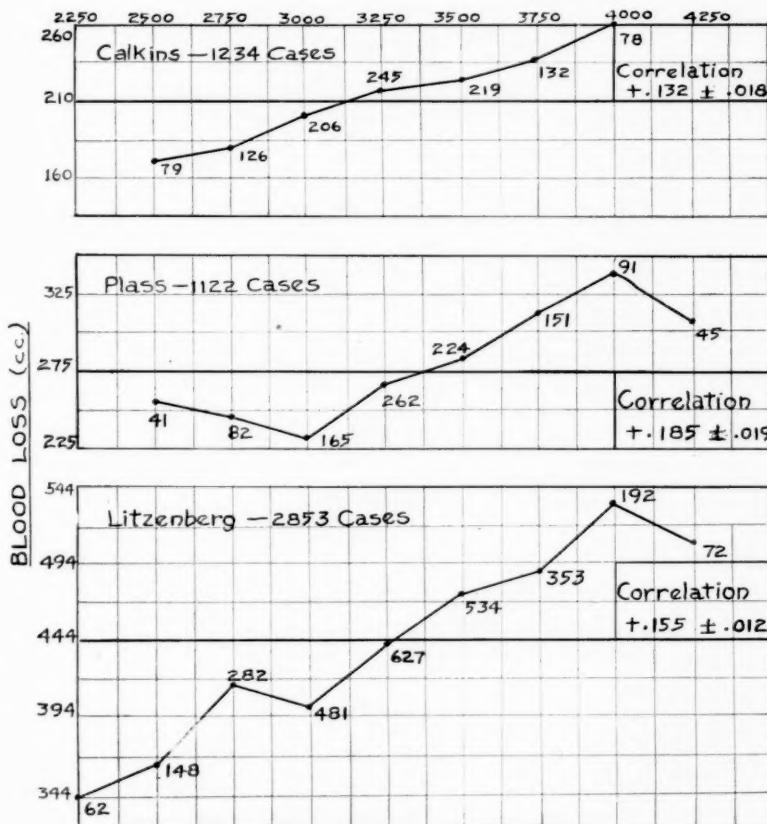


Fig. 7.—Showing weight of child, in grams.

in a long third stage. The point to be gained in this discussion is that, other things being equal, a short third stage is more apt to result in a small blood loss than is a long third stage.

SIZE OF CHILD

Fig. 6 shows a very definite relationship between the height of the child in centimeters and blood loss in cubic centimeters. There is a very definite upward trend in the curves, this being perhaps more marked in the Litzenberg series than in the Calkins series. The co-

efficient, however, is large in both instances, being seven times its probable error in one case and eight times its probable error in the other.

Similar results are shown in Fig. 7 concerning the weight of the child. A definite upward trend in the curve of each of the three series is present. The correlation coefficient varies from seven times its probable error to thirteen times its probable error. It is interesting to note that analysis of primiparae and multiparae separately (Fig. 8) shows that weight of the baby is a much more important item in determining

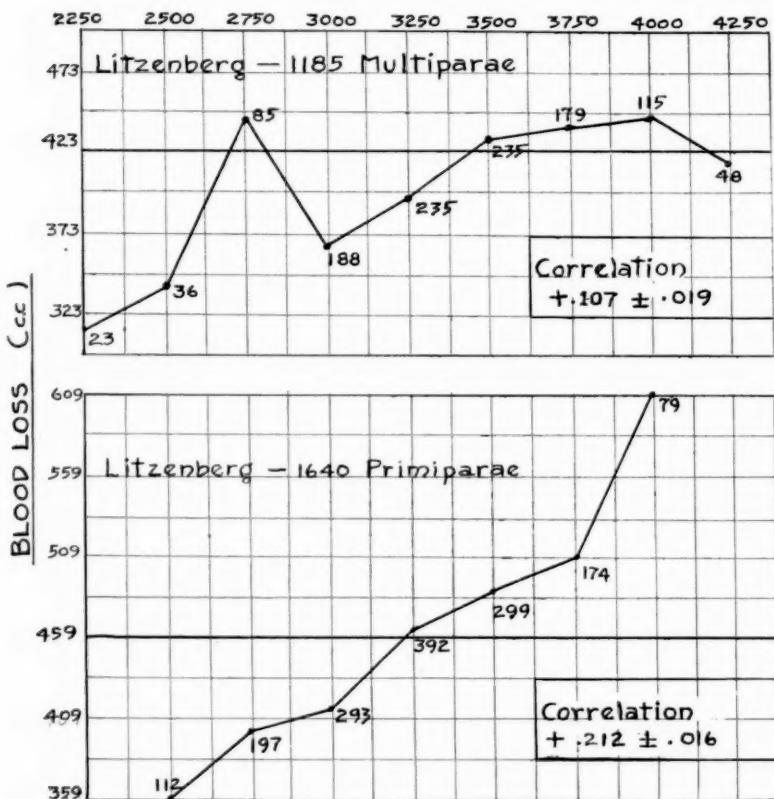


Fig. 8.—Showing comparative weights of children in multiparae and primiparae.

blood loss in the first labor than it is in subsequent labors. The pitch of the curve for primiparae is approximately twice as steep and the coefficient twice as great as the corresponding figures for multiparae. Size of the child, then, is a rather important factor in determining blood loss. Ahlfeld has previously called our attention to this relationship.

MISCELLANEOUS

Length of Pregnancy.—Fig. 9 reveals a rather definite connection between the length of gestation and the blood loss. The pitch of the curves

and the size of the coefficients are, however, not as great as those for height and weight of the child. It is probable, therefore, that length of pregnancy has a bearing on the blood loss only in that with longer pregnancies the child is larger and for practical purposes we need not consider the length of pregnancy but rather the size of the child.

Size of the Placenta (Fig. 10).—Whether one considers the weight of the placenta or the area of its maternal surface one finds a rather definite relationship between size of the placenta and blood loss. Here

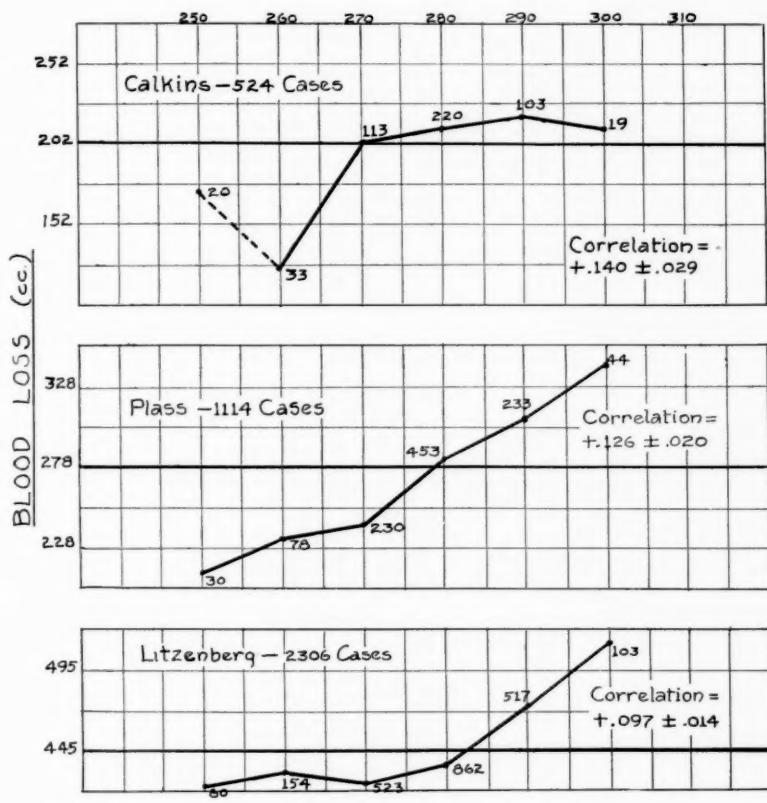


Fig. 9.—Showing length of gestation, in days.

again placental size seems to be more important in the primiparae than it is in the multiparae. In fact, the relationship in multiparae might be subjected to a slight doubt as the coefficient is only five times its probable error. Ahlfeld also noted the relationship between size of the placenta and blood loss.

Stature of the Mother.—Height and weight of the mother was found to have some considerable bearing on blood loss as stated in the preliminary report. Size of the pelvis was thought not to be a factor. No additional data is available at the present time.

SUMMARY

It would seem from the foregoing that age and parity have no effect on the blood loss at delivery. Length of labor, except for the length of the third stage, has also no demonstrable influence. The important and

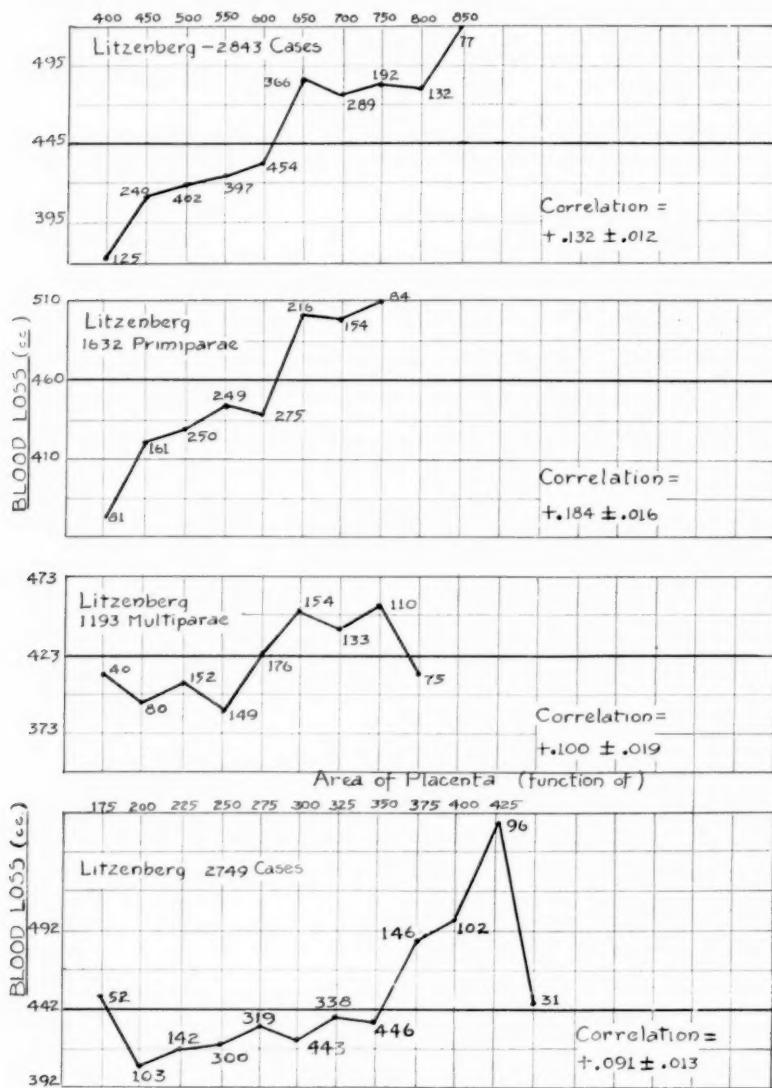


Fig. 10.—Showing weight of placenta in grams.

uncontrollable factors materially influencing blood loss are stature of the mother and stature of the child. These, along with duration of the third stage of labor, seem to account for most of the variation in blood loss in women delivered spontaneously and without severe laceration.

MANAGEMENT OF THE THIRD STAGE OF LABOR

There seems to be no difference of opinion on the point that there is no blood loss until after placental separation and that attempts to express the placenta before it is completely separated are ill advised. In order to have perfectly reliable information on the question of the duration of the third stage one should really study that portion of the third stage between the time of separation and the time of expulsion of the placenta. Inasmuch as there are no data on this point in any of the three series of cases studied this must remain a matter for future investigation. It seems quite likely that a very close relationship will



Fig. 11.

be found between the duration of this latter part of the third stage and the amount of blood lost. It would seem that several clinicians have come to this conclusion from clinical observation. The technic, or management, of the third stage of labor, as practiced by them, stresses the necessity for expulsion of the placenta as soon as it is definitely separated. Authorities are agreed that it is necessary to express the placenta from the lower genital tract in the vast majority of cases. The technic of this expression is of some importance. Squeezing the uterus would seem to be of equal importance to downward pressure. In fact, too much downward pressure should be avoided. We agree with Watson that, "in cases where forcible attempts at expulsion of the placenta are made in such a way as to push the uterus down into

the pelvis and make the cervix actually protrude at the vulva there is a grave danger of infection." The massage, so often necessary following the delivery of the placenta, should also be performed with care. It is suggested that *massage from side to side on the anterior aspect* of the body of the uterus below the fundus (Fig. 11) is preferable in that (1) it is quite as effective in producing contraction of the uterus and (2) it tends to keep the uterus up out of the pelvis. Both before and after the separation and delivery of the placenta it seems quite necessary that the attendant or his assistant *keep the hand constantly on the uterus* as there are numerous cases where marked softening and enlargement of the uterus will take place in the space of a few seconds' time. Such a softened and enlarged uterus is often quite difficult to handle in that it does not respond readily to massage or to the use of drugs and, consequently, there is a considerable blood loss before the uterus is again brought into firm contraction.

We should like to suggest the following technie for the management of the third stage of labor:

Immediately upon the birth of the baby the fundus is carefully located by the obstetrician, or an assistant, and is *held constantly until the placenta is separated and expressed and bleeding thoroughly controlled*. *Care is taken not to massage the uterus unless there be evidence of considerable softening or actual bleeding.* Of the signs of placental separation beginning bleeding (excluding cervical bleeding) would seem to be the most important. As soon as there is evidence of placental separation, the organ should be expressed by squeezing the uterus and making moderate downward pressure. This separation of the placenta takes place in the large majority of cases in from one to five minutes. Immediately following the delivery of the placenta firm contraction of the uterus should be produced by (1) the administration of pituitrin, hypodermically, and (2) moderately vigorous massage of the uterus. This massage is probably more important than the pituitrin. The uterus should be watched closely for at least one hour following delivery. Ergot may also be given (hypodermically?) at the discretion of the obstetrician. At the end of one hour all clots should be expressed from the uterus and vagina.

It is believed that this technie, carefully carried out, should result in an average loss of not more than 150 cubic centimeters of blood.

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A COMPARISON OF THE RESULTS OF SURGERY AND OF RADIATION IN THE TREATMENT OF CANCER OF THE CERVIX

AN ANALYSIS OF 200 CASES SUBJECTED TO RADIATION TREATMENT

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(From the *Cleveland Clinic*)

GENERAL DISCUSSION

A REVIEW of 325 cases of carcinoma of the cervix in which the patients were examined, treated, and observed personally between the years 1920 and 1929, inclusive, discloses the fact that in the cases seen in 1929 the disease was just as far advanced as in those seen in 1920, notwithstanding the numerous articles which have been written on the subject and the publicity given it by the Society for the Control of Cancer.

It has been correctly stated that for many years women have refused operation for cancer of the cervix because they felt that it was useless because of the frequent early recurrence. The extensive, successful use of radium within the past ten years should have eliminated this objection, but nevertheless the fact still remains that patients with this condition are presenting themselves too late for a cure to be accomplished. Moreover, the attempt to treat these advanced cases with radium has had a tendency to bring this method into disrepute because the pain with which the late stages of the disease are attended is believed by the laity to be due to a radium burn. For this reason many patients refuse radium treatment.

In most cases thorough questioning reveals the fact that the patient did consult a physician from four to six months before the disease was recognized and proper treatment instituted. If a patient consults her family physician because of some supposed menstrual disorder, he must assume the responsibility and convince himself by a thorough examination that there is or is not an existing pathologic condition; and if there is, the patient should be treated promptly. Consultation without proper examination leaves the patient with a false sense of security which leads to a delay of several months.

Investigation has also disclosed the fact that simple hysterectomy for carcinoma of the cervix is still in vogue in many smaller localities, whereas in most of the larger towns and clinics throughout the country it is generally conceded that radium and x-ray are the preferred methods of treatment. It would seem that ease of communication through medical

meetings and journals in the present age should have accomplished more than it has during the past ten years.

I think it quite safe to assume that the major controversy regarding the relative merits of surgical and radiation treatment for cancer of the cervix is settled. It is generally agreed that surgery is excellent treatment for early cases, but these are so few as to be almost disregarded. It is also quite fair to say that radiation will cure as many of the early cases as will surgery, without any mortality or morbidity.

Before the Medical Society of the State of New York in 1920, Reuben Peterson presented a paper on "Radical Abdominal Operation for Carcinoma of the Cervix" in which he reported that 40.09 per cent of his patients who were operated upon were permanently cured. However, he operated upon only 60 of 380 patients. In reality, 18 patients, or 4.7 per cent of the whole number, were cured. Fourteen died as the immediate result of operation. In view of present-day statistics, it is quite clear that if this group of 380 patients had been treated with radiation, the percentage of cures would have been considerably higher.

Wertheim, who developed the radical operation for carcinoma of the cervix and whose experience is greater perhaps than that of any other surgeon, found an operability of 48 per cent and was able to effect a five-year cure in 18.04 per cent. This means that out of 100 patients seen, 48 were operated upon. Allowing for a minimum mortality of 12 per cent, 42 patients would survive operation. Eighteen per cent of these patients were cured, which in reality means 9 out of the original 100 cases.

Norris, professor of gynecology at the University of Pennsylvania, makes the following statement: "We prefer radiation because when carefully analyzed, the end-results of surgery are no better than if as good as those secured by radiation. In the Clark Clinic we have not submitted a case of cancer of the cervix to hysterectomy for five years, and this, despite the fact that Dr. Clark was one of the pioneers in the radical operation."

Crossen states that his general plan of treatment of cancer of the cervix is to give a heavy dose of radium and follow this with deep x-ray therapy.

Kelly says: "On account of the numerous distressing recurrences even in the hopeful group (carefully selected cases of cancer of the cervix) there is a growing inclination to decline operation in favor of radiation." This statement from a man having such a large surgical experience should carry a great deal of weight.

G. G. Ward, Woman's Hospital of New York, makes this statement: "The morbidity results of the radical operation—fistula, thrombosis, suppuration, etc.—are not to be forgotten." He believes that in the very early stages of the disease, surgery will effect as many cures as will radium, but only at the expense of high primary mortality and greater morbidity. He has not performed an operation for carcinoma of the cervix since 1920.

Lynch, of the University of California, remarks: "Surgery should be restricted rather than developed, since it is amply proved that the results of radium and x-ray in the treatment of borderline cases far surpass those of surgery, and most of the cases fall in this group."

W. J. Mayo states: "Cancer of the cervix in the earliest stages is certainly as well treated by radium as by hysterectomy, and in the advanced cases where hysterectomy is not possible, radiotherapy will occasionally yield splendid local results; even though metastatic processes later appear without local recurrence, the benefit is as lasting as could be produced by the knife."

The opinions of these eminent men cannot be disregarded and it is reasonable to say that until some better treatment is discovered, radiation therapy is the best treatment for cancer of the cervix.

ETIOLOGY AND PROPHYLAXIS

The etiology of cancer of the cervix (or of any other part of the body) is not known, and it is not within the scope of this paper to discuss the various theories that have been advanced regarding it. We can only analyze as thoroughly as possible the conditions existing in the area in which cancer has become engrafted. The established relationship between chronic irritation and cancer gives hope that better obstetric care and surgical prophylaxis in the treatment of ulcers and tears will reduce the incidence of cancer of the cervix.

In a series of 5,000 cases studied by Graves, in which cervical repair had been done, only 4 patients later developed malignancy. While these figures have not been checked with an equally large series of cases, they furnish sufficient proof that repair operations, properly performed, are a most effective prophylaxis against cancer of the cervix. However, advanced cases will continue to be seen, and greater efforts must be made to improve the present methods of treatment.

DIAGNOSIS

Pain, hemorrhage, and an odorous discharge are undoubtedly symptoms of carcinoma of the cervix, but generally of a hopeless case. Therefore, the condition must be recognized before these symptoms appear. Any deviation from the normal menstrual cycle must be investigated and any discharge must be accounted for. The simplicity of the equipment for the pelvic examination, the fact that the cervix is easily accessible for inspection, and bearing in mind the fact that any discharge is pathologic, should render the diagnosis of carcinoma of the cervix a very simple matter for every physician. In case of doubt, we feel certain that biopsy does no harm.

CLASSIFICATION

Anyone who has treated a large group of cases is at once impressed by the varied, individual differences in resistance to cervical cancer, but as Burnam points out, "Neither the nature of normal body defenses nor knowledge as to how to amplify them is at hand."

Broders developed a method of evaluation of histologic malignancy by which the prognosis of a case can be expressed on a numerical basis,

dividing the cases into four groups according to the degree of cellular differentiation, the mortality rising correspondingly to the decrease in differentiation. The one drawback to this method is that this sort of work is necessarily subject to personal equation, and is difficult to standardize, just as a certain type of operation is difficult to standardize. Direct, personal contact with Broders would be necessary in order to develop a precise duplication of his method.

Stimulated by the excellent work of Broders, a tremendous amount of investigation is being carried on for the purpose of determining whether there is any definite relationship between the histologic structure of a carcinoma and its malignancy, and to try to deduce from this finding the best form of treatment for the particular type of condition in question, and to determine the prognosis.

Martzloff has carried on investigations relating to the predominant type of cell present, and from a study of 387 cases he concludes that the histomorphology of the predominant types of cells in epidermoid cancer of the cervix is important, as it indicates the relative malignancy of a given tumor. From his study he proved that the spinal cell type of cancer is the least malignant, the transitional cell type the next in order of increasing malignancy, and the fat spindle cell type, the most malignant of all. However, we know that pathologists frequently differ as to the classification of an individual cell. Hueper objects to Martzloff's method on the ground that the evaluation of histologic malignancy based on only one factor is incomplete and incorrect. He believes that a carcinoma is not sufficiently characterized by the cell type alone; the amount of anaplasia must also be taken into consideration.

Hueper has developed a technic of evaluation of histologic malignancy based on twenty factors which are recognized as being characteristic of differentiation and anaplasia, and which are evaluated on a percentage basis. The sum of these results translated into numerical values he calls "histologic malignancy index" or "histologic malignogram." He believes that this method is freed to a large extent from the influence of personal experience and interpretation through the introduction of well-defined standards, so that a duplication by other workers is made possible. This is an elaborate piece of work and undoubtedly will go far toward solving the problem, but again, for routine work, it probably is not practical. However, it is to be hoped that from all these investigations will come eventually a simple formula which will help the clinician to classify his cases more intelligently and thereby improve his end-results. So far we have not attempted to grade our malignant cases.

Merely the classification of the malignancy according to histologic structure does not, however, tell the story of the end-result. It is important also for the clinician to classify his cases according to the extent of the disease. A Grade 1 malignancy with wide extension would not be expected to have the same chance of cure or of palliation that a Grade 3 or 4 would have, if it were absolutely confined to the cervix.

An effort is being made to standardize the many classifications of malignancies which are in use at the present time. Some clinicians classify them merely as operable, borderline, or advanced; others divide

them into four groups and some into five groups. For working purposes, we believe that the classification into four groups made by the American College of Surgeons is quite practical, except in regard to the question as to whether or not the broad ligaments are involved. Very frequently it is impossible to decide whether the condition is inflammatory or whether it is malignant. The case of recurrent carcinoma of the cervix after hysterectomy (complete or supravaginal) should also be segregated from the primary cases.

RATIONALE AND TECHNIC OF RADIUM THERAPY

For practical purposes, the simple idea that radiation is a means of destroying cancer cells without too much injury to the normal cells is a good working hypothesis, but by reason of our accumulating knowledge of the physics of radiation, and of the biologic effects of radiation, we are being led to a better understanding of its action. In brief, radium has a threefold action on malignant tissue. It affects (1) the cancer cells (2) the connective tissue, and (3) the blood and lymph vessels. The action on the cancer cell is shown microscopically by swelling and vacuolization of the protoplasm and by shrinking of the nuclei. This is followed by phagocytosis and absorption and replacement by a homogeneous connective tissue. This contracts and affects the lymphatic and smaller blood vessels and starves the growth.

There is not sufficient time to enumerate the varieties of technic which have been used since radium therapy was instituted nor to mention all the men who have contributed to the advancement of our present knowledge. Suffice it to say that there are two entirely different schools of thought in regard to the method of treatment. In one the opinion is that it is best to give large massive doses in a short space of time, preferably in one, or at most, two sittings. The other is that it is preferable to give very small doses over a longer period of time. I believe that most of the large clinics in this country favor the former opinion, while the latter group is led by Regaud of the Radium Institute of Paris. This difference of opinion will undoubtedly be settled before many years, after the results of both methods are compared. Standardization of radium dosage for uterine cancer is impractical, dosage and technic must vary with the character and location of the involvement.

The technic followed in the Cleveland Clinic has varied very little during the past ten years, the only change being that since we have had a larger amount of radium available, we are giving larger doses over a shorter period of time, and we try to give the complete dose at one sitting, whereas previously the total amount of radiation was given in two doses. The average dose given in our earlier cases was 4200 mg. hours distributed evenly in and against the cervix. In our later cases, since we have combined radium with high voltage x-ray, the average

dose is about 3,600 mg. hours. Our standard screen is made of brass, one and one-half mm. in thickness, and this is encased in a rubber tube 3 mm. thick. At the present time we place a tube in the fundus as well as in the cervix, because in our earlier cases we found frequently that a patient would be free from symptoms for a year or so and then suddenly have bleeding and discharge, and examination would reveal a large undermined cavity at the upper end of the vagina due to the fact that the radium had not been placed high enough in the cervical canal. From this finding we are led to believe that an anesthetic is necessary in order to estimate the extent of the growth, and also to place the radium accurately in proximity to the growth. It is sometimes impossible, even when the patient is under an anesthetic, to place a tube of radium high in the cervical canal.

In addition to the radium tubes placed in the fundus and cervix, two or three tubes are placed against the cervix and these are held in place by packing the vagina tightly with gauze. If the growth is of the cauliflower variety, it is frequently curetted away or radium needles are placed in it. A catheter is then placed in the bladder to keep it empty and therefore as far away as possible from the radium. Care should be taken in transferring the patient from the table to the cart and from the cart to the bed. We believe that bending and twisting of the patient during the transfer will dislocate the vaginal tube and may account for bladder and rectal symptoms. The best method is to place the cart alongside the table and slide the patient on to the cart by a sheet, and from the cart to the bed in the same manner, so that the position of the patient is unchanged throughout the procedure. We have not used gold seeds in the treatment of any of these primary cases, but they are of great value in the treatment of recurrences, because their action is more or less localized. Large, heavily filtered doses frequently are harmful in the treatment of recurrence. We have not had any experience in placing gold seeds in the broad ligaments by laparotomy.

We have tried numerous remedies for radium sickness but none is entirely satisfactory. Many patients have no sickness even after large doses of radium. In some cases the sickness is due not to radium but to the anesthetic or to the morphine which is given for pain or discomfort.

The majority of the patients are able to leave the hospital the day following treatment unless they live some distance away. They are instructed not to be too active and to take a douche once or twice daily. They are given an appointment to return in three or four weeks for high voltage x-ray therapy which is administered by Dr. Portmann. The treatment is given in four or five doses over a period of four or five days. In 1925, we gave the x-ray treatment in two doses on the days immediately following the radium treatments, but we soon found that this method did not give satisfactory results, for statistics show

that in that year the duration of life after radium treatment was greatly reduced and the patients led a very miserable existence on account of rectal and bladder symptoms.

After patients have been treated we make an effort to have them return at monthly intervals for three months, and after that, every three months during the following year. If local recurrences develop, they are treated with seed implantation. If the recurrence is deep, x-ray therapy is repeated, with marked relief for a time. In cases in which there is no ureteral involvement, but pain is referred down the legs, we plan in the future to do a chordotomy, just as a gasserian ganglion operation is done for relief of pain in cases of extensive malignant disease of the face.

We have always taken the stand that surgery following apparent cure by radium therapy is not only unnecessary but is frequently disastrous, and many surgeons who employed this procedure from five to ten years ago have now abandoned it. Neither should radiation be relied upon to offset the disaster of an incomplete operation.

COMPLICATIONS

The chief complications in the treatment of carcinoma of the cervix by radium are hemorrhage, symptoms referable to the rectum and bladder, and fistulae (urinary and fecal).

Hemorrhage may be due to the natural progress of the disease or to ulceration caused by the radium. We believe the former is the usual cause. In the most serious cases packing and transfusion are sufficient to control the hemorrhage.

Bladder and rectal symptoms are of two types—early and late—and it is quite important that they should be recognized. It is reasonable to assume that if a sufficient dose of radium is given to cure carcinoma of the cervix, it will also be sufficient to produce an erythema to the rectum or bladder. Very often this erythema is slight and passes unnoticed unless the patient is questioned. If it is severe, it is evidenced by a slight burning sensation and a desire to go to stool or to void somewhat more frequently than usual. In the mild cases, the condition usually clears up in ten days or two weeks, but in the severe cases from four to six weeks may be required. It is in this latter group that the late rectal and bladder complications develop, usually six or eight months after the initial radiation treatment. These late symptoms are frequently mistaken for a recurrence of the carcinoma, and if the patient is treated for recurrence, irreparable damage will result. A clue to the true state of affairs is found in the fact that the symptoms are out of all proportion to the findings. There is severe pain and tenesmus and the stool contains considerable blood and mucus. Digital examination causes greater pain than in the case of recurrence. The patient is not cachectic. Proctoscopic examination reveals a puckered up scar or small ulcer at about the level of the cervix with telangiectasis and considerable

redness of the mucosa. The condition may be compared to an over-treated area on the skin which is healed by the formation of scar tissue through which fine vessels may be seen to course. In the rectum the scarring is subject to trauma and infection with subsequent ulceration which causes the late symptoms.

The same is true in the case of late bladder symptoms. Cystoscopic examination will reveal an area of intense redness and sometimes ulceration. We have observed several cases of this type over a period of months, and a few over a period of two years. Occasionally the urinary salts will be found deposited in the slough in the bladder and stones will be formed.

For the rectal symptoms the treatment consists of rest in bed, cleanliness of the lower bowel, and the injection of three or four ounces of warm olive oil into the rectum twice a day. Occasionally an opium suppository is necessary.

For the bladder symptoms we recommend rest, irrigation of the bladder, and the instillation of gomenol.

Some of these bladder and rectal complications may take from four to six months to clear up.

Fistula.—We know that the natural progression of carcinoma of the cervix will cause a certain number of fistulae into the rectum or the bladder. In some of our earlier cases fistulae may have resulted from treatment of the carcinoma, but we feel certain that with our present-day knowledge and our improved methods of treatment, the incidence of fistula will be lower than in cases in which the patient has received no treatment at all. If the fistula appears soon after treatment we interpret it as being due to destruction from the disease. If it appears late, and there is no evidence of recurrence of the carcinoma, it is probably due either to progressive ulceration or to the later complications mentioned above, and hence is the direct result of radium treatment.

The method of treatment of a fistula in the rectum must depend upon its size and the amount of inconvenience experienced by the patient. A small fistula may not require treatment. If a large fistula is present, it may be advisable to do a colostomy before attempting to repair it, and close the colostomy if and when the repair is successful.

The urinary fistula is more annoying on account of the constant flow of urine. If the fistula is small, it can easily be repaired by operation. If it is irreparable, the patient would be made more comfortable by transplantation of the ureters into the sigmoid.

END-RESULTS

The statistics reported from the United States and abroad in regard to the end-results of treatment for carcinoma of the cervix are too numerous to be published separately, but if they are combined into one group, the following results will be shown:

Five-year cures	25 per cent
Clinical cures—three years	35 to 40 per cent
Clinical cures—less than three years	about 50 per cent

From the series of 325 cases here reported, 11 were pronounced hopeless and no treatment was advised. This decision would seem to have been justified by the fact that in these 11 cases the average duration of life was only six weeks. Twelve patients refused treatment or went elsewhere. Twenty-three patients had been treated elsewhere and referred back to the Clinic. Thus, we attempted to cure or palliate the disease in 97 per cent of our cases.

Below are shown in tabular form statistics of 241 cases of primary carcinoma of the cervix treated in the ten-year period from 1920 to 1929, inclusive.

YEAR	TREATED	TRACED	NO.	PER CENT	YEARS	DEAD	DURATION OF LIFE
<i>Living Over Five Years</i>							
1920	8	8	2	25	9	6	11 months
1921	17	15	4	24	8	13	10½ months
1922	22	21	5	23	7	17	16 months
1923	26	23	5	20	6	21	17 months
1924	24	21	8	33	5	16	18 months
	97	88	24	25	5	73	14½ months
<i>Living—Three to Five Years</i>							
1925	21	17	5	25	4	16	10 months
1926	30	25	9	30	3	21	13 months
	51	42	14	27½		37	11½ months
<i>Living—Less than Three Years</i>							
1927	32	26	10	31	2	22	14 months
1928	13	10	6	46	1	7	12 months
1929	48	42	35	66	-1	13	— months
	93	78	51	54		42	

It will be seen that of 97 patients treated over five years ago 25 per cent are alive and well. Patients not traced are counted as dead. The average duration of life of patients who died was fourteen and one-half months. Fourteen, or 27½ per cent are living from three to five years, and 54 per cent are alive from one to three years following treatment.

In conclusion, it is to be hoped that eventually the disease will be recognized earlier, and this, combined with our increasing knowledge of the behavior of cancer and our improved technic of treatment, will increase our curability rate.

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EAST NINETY-THIRD STREET.

Jones, E. M.: Affections of the Round Ligament with a Report of a Case of Double Tuberculous Hydrocele. Minn. Med. 13: 247, 1930.

Besides an extensive review of the affections of the round ligament with special reference to tumors, the author reports a case of tuberculous hydrocele, the only case on record as far as he has been able to determine. It occurred in an eighteen-year-old unmarried girl, who had noticed swellings in the inguinal regions gradually increasing in size over a period of a year, accompanied by pain and dysuria. The masses were soft, presented at the enlarged external inguinal rings, could be easily reduced, and transmitted a slight impulse on cough. Urinary and pelvic examinations were negative. At operation the cystic masses were found to extend to the internal rings, were densely adherent to the posterior wall of the canal, but did not involve the peritoneum. They were removed and the patient made an uneventful recovery. Pathologic examination showed the specimens to be cyst-like sacs, the left multilocular, and the right unilocular, both filled with yellow, gelatinous material. The walls showed numerous miliary tubercles. There were no abnormal findings in the patient to account for the condition, even though careful and complete subsequent examinations were made. The only significant feature was a history of repeated attacks of pleurisy which in the author's opinion represents an old tuberculous infection.

FRANK SPIELMAN.

THE SEDIMENTATION RATE IN GYNECOLOGY AND OBSTETRICS*

RESULTS BY THE MODIFIED WESTERGREN TECHNIC IN OVER 2000 DETERMINATIONS ON 1100 PERSONS

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THE recent development of a rapid and convenient method for the determination of the sedimentation rate of the red cells¹ led us to make this study to discover the diagnostic value of this particular technic and to establish as a basis for comparison typical figures for the different conditions included in the fields of obstetrics and gynecology. A total of 2100 tests on 1145 persons form the basis for the conclusions here presented. Of these, 220 tests were on healthy women. The results in medicine, surgery, and the other specialties will be presented elsewhere.¹

Since the extensive literature has been reviewed recently by Fähreus² and others,³ it will not be discussed here.

DISCUSSION OF CURRENT METHODS

A large number of methods have been devised, all of which give results of clinical value. Each, however, has at least one disadvantage. In the case of the methods that require sedimentation to a definite point, the necessity of making frequent observations is a distinct disadvantage. Methods that require sedimentation for longer than one hour are not so desirable as the short time method described in this paper. In those methods in which test tubes are used, the cleaning of the tubes is difficult. All these methods require a special dilution of the blood with anticoagulant solution which constitutes not only an extra step in the procedure, but introduces another possible source of error. We consider dilution of the blood undesirable if it can be avoided.

THE METHOD USED IN THIS WORK

A recent modification¹ of Westergren's method by H. D. Haskins, F. E. Trotman, and E. E. Osgood was chosen for this work because it eliminates the above listed disadvantages. The only pieces of appara-

*Acknowledgement is due P. Blakiston's Son & Co., Inc., Philadelphia, for permission to include in this article excerpts from the *Textbook of Laboratory Diagnosis*, by Edwin E. Osgood and Howard D. Haskins.

tus required are pipettes* graduated from 0 to 200 mm. at the tip, and a rack† for supporting them in a vertical position. (Figs. 1 and 2.)

The technic is as follows: Draw well-mixed oxalated venous blood up to the zero mark on the pipette, wipe the excess blood off the tip, and insert in the special rack. Press the tip of the pipette against the rubber before releasing the finger. Note the upper level of the blood if it is not exactly at the zero mark and record

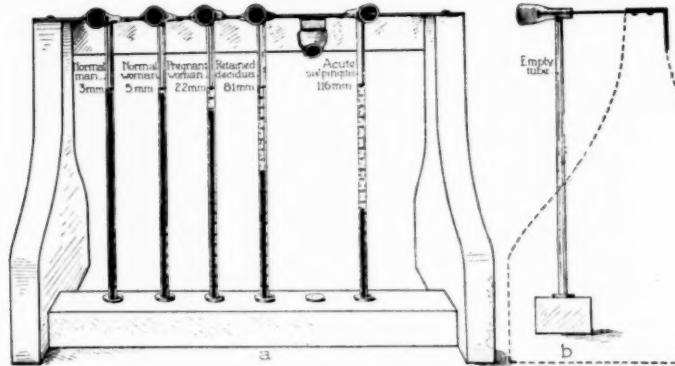


Fig. 1.—Rack with tubes in position held in place by spring and rubber piece.

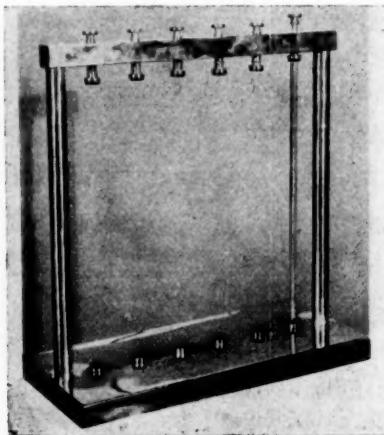


Fig. 2.—Improved rack.

the time; read the upper level of the red cells at fifteen and forty-five minutes after the start. If the red cells do not form a sharp layer, estimate the correct level.

Since this method is one of those included in the uniform system of hematologic methods for use with oxalated venous blood,⁴ recommended by E. E. Osgood, H. D. Haskins, and F. E. Trotman, it is done on the same blood sample that is used for other hematologic or blood chemistry methods. No dilution of the blood is made. The test tube

*Obtainable from Arthur H. Thomas Co., Philadelphia (Specification No. 1710 C).

†Obtainable from National Appliance Company, 211 Oak St., Portland, Ore.

in which the blood is collected should contain 2 mg. of powdered potassium oxalate for each 1 e.c. of blood to be drawn. The report can be ready in forty-five minutes after the blood reaches the laboratory. After it is once set up, the technician need look at it only twice; once at fifteen minutes, and once at forty-five minutes, thus saving considerable time. Only 1 e.c. of blood is required. The tubes are more easily cleaned than the ordinary 1 e.c. pipette.

METHOD OF REPORTING RESULTS

Early in this work the distance traversed by the top of the red cell column in the thirty minute interval between the fifteen and forty-five minute readings was chosen as the best indication of the true sedimentation rate, and this form of reporting the rate has been retained in this paper. Study of our completed figures reveals, however, that in certain cases, more information is gained when both the fifteen minute and forty-five minute readings are reported.

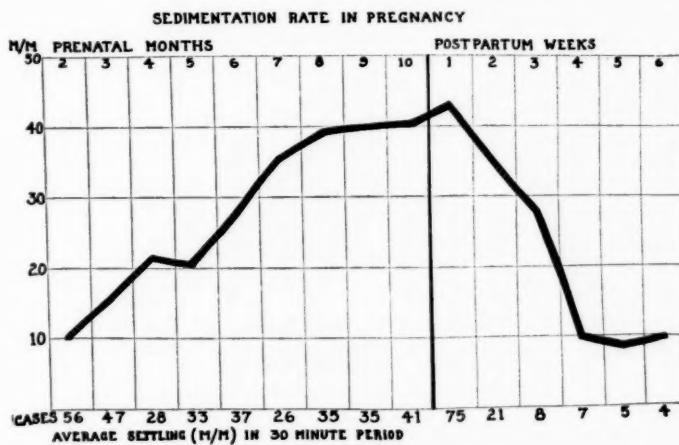


Fig. 3.

NORMAL VALUES

Studies of two hundred healthy nurses have established a rate of 10 mm. (e.g., 5 mm. in fifteen minutes and 15 mm. in forty-five minutes) as the extreme upper limit of normal. Ninety per cent showed rates of less than 7 mm. The variations between different phases of the menstrual cycle were too slight to be considered separately. A rate more rapid than 10 mm. should be interpreted as abnormal even during menstruation.

OBSTETRIC PATIENTS

The results are presented in Table I and Fig. 3. Note that unless there are other complications, the sedimentation rate in the pregnant woman remains normal until the third month, at which time an increase usually begins. From this time on, in most cases, it increases

throughout pregnancy, reaching a high point in the tenth month. In eight patients (2.7 per cent of the prenatal cases) an unaccountably slow rate persisted throughout pregnancy.

The average sedimentation rate in uncomplicated postpartum cases is somewhat higher than that of the tenth prenatal month. It then gradually decreases and in the uncomplicated case reaches normal at about the end of the fourth week. We have studied a series of thirteen postpartum cases complicated by such conditions as pelvic peritonitis, retained clots, pyelitis, thrombophlebitis, retained placenta, breast abscess, and infected perineal wounds. The average sedimentation rate in the second week in these cases was 75 mm. This gradually decreased as the patient recovered, and reached the normal in approximately the tenth to twelfth week, depending, of course, on the pathologic condition.

TABLE I. PRENATAL AND UNCOMPLICATED POSTPARTUM CASES

PRENATAL CASES			UNCOMPLICATED POSTPARTUM CASES		
MONTH	TESTS	AVERAGE 30 MINUTE READING	WEEK	TESTS	AVERAGE 30 MINUTE READING
Second	56	10.3	First	88	43.7
Third	50	14.8	Second	25	36.0
Fourth	28	21.8	Third	10	27.0
Fifth	33	21.2	Fourth	7	10.0
Sixth	38	27.3	Fifth	5	9.0
Seventh	28	34.6	Sixth	4	10.0
Eighth	37	38.4	Seventh	1	6.0
Ninth	35	39.1	Eighth	5	7.0
Tenth	45	40.5	Third month	6	9.0
			Total number of obstetric patients		305
			Total number of tests		537

GYNECOLOGIC PATIENTS

Abortion.—Sixty-two cases of abortion were examined. Of these only six cases showed a normal sedimentation rate. It has been our experience that in the absence of fever, infection, or leucocytosis ("clean" cases), the sedimentation rate returns to normal within fifteen days following curettage. We found that in cases of perimetritis, pelvic cellulitis, and pelvic abscess associated with abortions, the sedimentation rate was *most markedly increased*. We have twenty readings of over 100 mm. (forty-five minute reading). In one case of abortion complicated by epidemic parotitis, the readings were 27 mm. in fifteen minutes and 143 mm. in forty-five minutes. A considerable increase in sedimentation rate apparently occurs even in patients with simple retention of uninfected products of conception.

Tubal Pregnancy.—In each of the eight cases of ruptured tubal pregnancy studied, the sedimentation rate was definitely raised. The average of the five uncomplicated cases in the group was 22.5 mm., but in

TABLE II. SEDIMENTATION RATES IN GYNECOLOGIC CASES

NO. OF CASES	NO. OF TESTS	DIAGNOSIS	AVERAGE SETTLING (MM.) IN THIRTY MINUTE PERIOD IN THE UNCOMPLICATED CASES	REMARKS
62	146	Abortion	38.6	
8	22	Tubal pregnancy	22.5	All ruptured.
12	13	Sterility	4.5	
6	7	Asthenia	4.4	
138	530	Salpingitis	42.3	First test before treatment or operation.
4	10	Pelvic abscess	40.5	First test before treatment or operation.
39	81	Fibroid	16.0	First test before treatment or operation.
14	27	Malignancy	35.6	First test before treatment or operation.
55	56	Cervical erosions	7.0	
17	36	Ovarian cysts	11.0	
(16)		Ovarian cysts	5.0	Exclusive of case of chocolate cyst.
40	43	Trichomonas vag. vaginitis	8.0	
23	33	Infection of Skene's or Bartholin's Glands	22.0	
13	13	Froehlich's syndrome	Normal	
12	12	Endometrium hyperplasia	15.9	
80	186	Cystocele, rectocele, retroversion, and prolapse	Normal	Practically normal in most uncomplicated cases.
96	120	Miscellaneous	Varying	
619	1335			

no case was the sedimentation rate as high as is usually found in acute or subacute salpingitis. Unruptured ectopic pregnancy would doubtless give still lower rates.

Sterility.—Twelve cases of sterility showed only one case in which the sedimentation rate was increased and that was complicated by bleeding uterine myomas.

Asthenia.—Six cases were classified as asthenia, all of these having very low sedimentation rates, the average for the six being only 4 mm.

Salpingitis.—There were 138 patients with salpingitis on whom 529 tests were done. The average rate at the first examination was 42.3 mm. We have found that the sedimentation rate is usually increased in salpingitis, both acute and subacute, and in pelvic cellulitis and pelvic abscess. Notwithstanding the average increase there are too many normal or low rates to give this test much weight in the differential diagnosis between salpingitis and ectopic pregnancy. It does have

great value, however, as an aid in determining the progress of the individual case. This is best shown graphically (Fig. 4). Note the great decrease in rate in each group in cases under medical management alone, prior to operation.

It has been our custom for some time in cases of salpingitis to use the sedimentation rate test as the criterion for time of operation, i.e., we are convinced that the operation for salpingitis does not give the maximum good results and safety to the patient unless it be done when the sedimentation rate has reached normal. We feel that in salpingitis

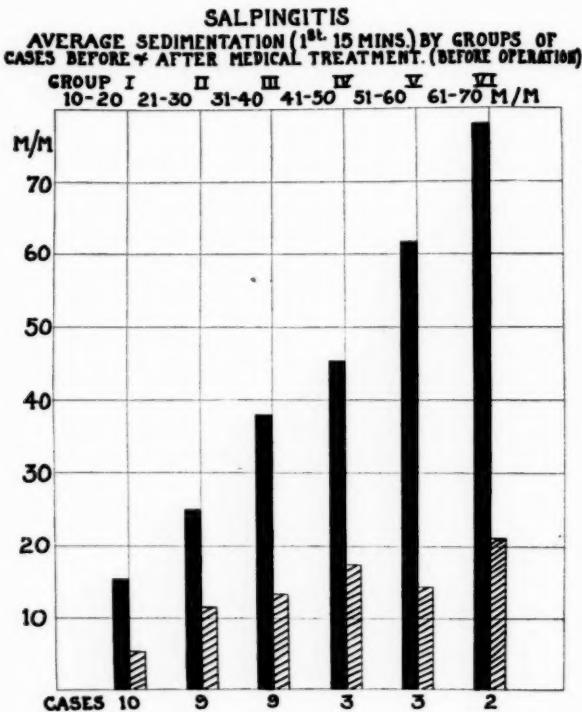


Fig. 4.

this test is definitely more sensitive than the temperature record or the leucocyte count in determining when the infection has become "cold." By this means, our mortality rate has been reduced, our postoperative hospital days have been cut down, and practically all of our patients are operated upon without drainage.

Uterine Myomas.—From the thirty-nine cases of uterine fibroids studied, we have reached the conclusion that uncomplicated uterine fibroids do not materially alter the sedimentation rate. On the other hand, degenerating tumors and those complicated by endometrial disease or polyps and those in which submucous myomas are causing bleeding, increase the rate as far as our experience has gone.

Malignancy of Ovary or Uterus.—There were 14 cases with an average of 35.6 mm. Except in a case of small recurrent papilloma of the cervix, the rates were all markedly increased, a fact which gives the test definite value in the differentiation between such a condition and an erosion of the cervix.

Cervical Erosion.—There were 55 cases classed as cervical erosion in the series. Among the complications observed which increased the rate were syphilis, hyperplasia of the endometrium, anemia, and infected tonsils or teeth. In the uncomplicated cases, the rate was normal.

Ovarian Cysts.—There were 17 cases of ovarian cysts in the series. Simple, uncomplicated ovarian cysts appear not to alter the sedimentation rate. One case of chocolate cyst of the ovaries gave a reading of 12 mm. in fifteen minutes and 56 mm. in forty-five minutes, and at operation no other complication was found.

Trichomonas Vaginalis Vaginitis.—There were 40 cases in this group. The rates in the uncomplicated cases were practically always normal. There was one case in which vaginitis was extremely severe and in which the sedimentation rate was 8 mm. in fifteen minutes and 39 mm. in forty-five minutes. There were 11 other cases with rates above normal. These were complicated by pyelitis, abortion, osteomyelitis, uterine fibroids, acute appendicitis, pelvic cellulitis, infection of Skene's glands, and ischiorectal abscess.

Infection of Skene's or Bartholin's Glands.—There were 23 cases examined. Here the sedimentation rate was always increased, striking an average of approximately 22 mm.

Froehlich's Syndrome.—Thirteen such cases were studied. Of these the sedimentation rates were within normal limits with the exception of three cases, one complicated by syphilis and two with acute respiratory infections.

Cystocele, Rectocele, Retroversion and Prolapse of the Uterus.—We examined 80 patients in this group. These conditions, when uncomplicated, do not increase the sedimentation rate. Such complications as arthritis, severely infected tonsils, pregnancy, and severe endocervicitis tend to raise the rate above normal.

Miscellaneous Cases.—There were 96 cases coming under this heading. Obviously these conditions were variable. These tests were made in the routine examination of the patients and were indeed very helpful in making diagnoses. Whenever the sedimentation rate was increased, a condition was usually found to account for it. Among such conditions can be mentioned adenitis, syphilis, chancreoid, cholecystitis, anal fistula, rectal abscess, hyperplasia of the endometrium, infected wounds, and hematomas.

Postoperative Effects.—The sedimentation test has been frequently used by us postoperatively. We have learned that the sedimentation

rate is increased during the healing process of the wound⁵ and that under normal conditions it gradually decreases. When this fall in the sedimentation rate does not occur, or if there is a rise, we search for and expect to find some complication, such as wound infection or an abscess or hematoma. Hence, routine postoperative sedimentation tests at frequent intervals are desirable.

COMMENT

In general, it may be said that the rate is increased after the third month of pregnancy until the fourth week postpartum, and in conditions associated with infection, internal hemorrhage, or necrosis of tissue, and that the increase in rate is roughly proportional to the extent and severity of the process. We have found that the injection of foreign protein also increases the rate. There are, however, so many causes of an increased rate and enough exceptions to the above rule, that it must be used with caution and without neglecting other available evidence in differential diagnosis. It has great value in following the course of the individual case, particularly in salpingitis. In the routine examination of a patient, the detection of a rate greater than is expected from the other clinical findings calls for further study of the case. This constitutes one of the greatest advantages of the test to the clinician. The ease with which such clues are obtained make the test rank with the clinical thermometer as an aid to accurate diagnosis.

SUMMARY AND CONCLUSIONS

The technic is given for an accurate test permitting a report on the sedimentation rate within forty-five minutes after the blood reaches the laboratory.

This test has distinct advantages over other methods of determining the sedimentation rate for the patient, physician, and technician.

Results of a large series of studies in normal women and in gynecologic and obstetric conditions are presented.

Its chief value is as a clue to the existence of previously unsuspected infection or malignancy and in following the course of the individual case.

Repeated determinations on the same individual are essential if the maximum information is to be obtained.*

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*We wish to express our appreciation to Albert Holman, M.D., and to Austin H. Osgood, B.S., for assistance in this work.

OBSERVATIONS ON THE FUNCTIONAL MENSTRUAL DISTURBANCES OF ADOLESCENTS

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(From the Department of Obstetrics and Gynecology, State University of Iowa)

IN GROPING for added light on the menstrual disturbances of adolescents, we have studied the basal metabolic rate and the uterine curettings, as well as the size of the sella turcica, as revealed by the roentgen ray, and the physical proportions, as determined by Berkow's formulas. In the latter two instances, it was necessary to run large series of controls to establish normals, so that this is merely a preliminary communication dealing with our limited findings.

THE BASAL METABOLIC RATE

It is well established that marked variations in thyroid gland function, as shown by the basal metabolic rate, may have a profound effect upon the menstrual function, but it is not generally realized that minor variations may likewise apparently be significant. There is a tendency to minimize the importance of rates between -10 and -20 per cent, and to discount almost entirely those between zero and minus ten, although our experience would indicate that they are more frequent in adolescent menstrual disturbances than are larger variations. With both amenorrhea and menorrhagia associated with such changes, we have been unable to determine a quantitative difference, both conditions occurring with rates only slightly depressed or down to -30 or -40 per cent. One-third of the menorrhagia group showed rates as low as -15, while one-half of the amenorrheics reached this level. In certain instances, menstrual abnormalities occurred with normal rates, although the clinical history suggested hypothyroidism, and we are not averse to making such a diagnosis in the absence of laboratory confirmation.

The therapeutic results obtained with the cautious use of thyroid extract, especially in menorrhagia, are so good as to suggest the advisability of administering the drug to such patients even when the basal metabolic rate is not particularly low. In amenorrhea the effect is not so readily obtained, although occasional satisfactory results are secured. While in menorrhagia it is commonly possible to control the excessive bleeding within a few days by the employment of thyroid extract, intermittent treatment over a period of months may be needed, since there is a tendency for the profuse flow to recur when the extract is not taken. We have several girls between the ages of fifteen and eighteen years to whom intermittent medication is being given in the hope that gradually a readjustment will occur to render it unnecessary.

THE ENDOMETRIUM

Even in the absence of demonstrable pelvic disease, we have frequently curetted those young women who complain of excessive flow, and have convinced ourselves that the endometrium is normal histologically or shows a hyperplasia, which is not readily explained. The therapeutic value of the procedure is limited and temporary, but in persistent cases the knowledge that a serious lesion is not being overlooked is consoling.

In amenorrhea the curette is not employed, since its therapeutic use is scarcely justified, and there is always the danger of removing an early gestation. With our present knowledge that the pelvic organs are dependent upon distant glands for stimulation and development, local irritation of the uterus hardly seems reasonable.

Table I presents the basal metabolic rates and the histologic diagnoses in certain typical cases.

TABLE I. BASAL METABOLIC RATES AND HISTOLOGIC EXAMINATIONS OF THE UTERINE MUCOSA IN TYPICAL CASES OF MENORRHAGIA AND SECONDARY AMENORRHEA

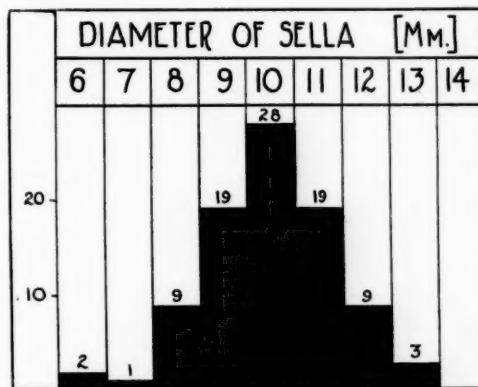
HOSPITAL NUMBER	AGE	COMPLAINT	GIRLS UNDER 20 YEARS OF AGE		PATHOLOGIC DIAGNOSIS	
			BASAL METABOLIC RATE			
			BEFORE THYROID	AFTER THYROID		
B- 2725	15	Menorrhagia	-15.0	+11.0	Normal endometrium.	
A- 2534	15	Menorrhagia	-22.8	+ 3.0	—	
D- 1199	17	Menorrhagia	-21.2	+ 5.2	Normal endometrium.	
C- 8387	18	Menorrhagia	-7.3	+12.8	Normal endometrium.	
C- 265	17	Menorrhagia	-18.3	+ 4.0	Hyperplasia of endometrium.	
E- 4641	16	Menorrhagia	+14.3	None given	—	
D- 6548	19	Menorrhagia	- 4.3	—	Normal endometrium.	
B-10971	15	Menorrhagia	-22.5	- 8.1	—	
E- 5219	19	Menorrhagia	- 8.4	—	Hyperplasia of endometrium.	
E- 2038	16	Amenorrhea	- 7.7	—	—	
E- 2309	17	Amenorrhea	-43.0	- 5.6	—	
D- 4037	17	Amenorrhea	-16.5	+ 2.1	—	
WOMEN OVER 20 YEARS OF AGE						
C- 8283	21	Menorrhagia	-10.5	- 1.8	Normal endometrium.	
E- 5393	22	Menorrhagia	- 9.7	—	Normal endometrium.	
C- 7658	24	Menorrhagia	- 7.2	—	Normal endometrium.	
B- 9251	24	Menorrhagia	-12.4	—	Normal endometrium.	
D- 5271	24	Menorrhagia	- 8.0	—	Hyperplasia of endometrium.	
D- 4737	22	Menorrhagia	+13.2	—	Hyperplasia of endometrium.	
A- 411	22	Menorrhagia	-15.6	+19.1	Hyperplasia of endometrium.	
D- 1242	24	Menorrhagia	-10.8	+ 5.9	—	
A- 4325	21	Menorrhagia	-25.6	+ 2.9	—	
C- 8610	24	Amenorrhea	-18.9	+ 4.8	—	
E- 1521	24	Amenorrhea	-25.5	-15.3	—	
D- 2757	24	Amenorrhea	-15.4	—	—	

THE SIZE OF THE SELLA TURCICA

Recognizing the validity of the recent declaration that the hypophysis is "the motor of the ovary," and suspecting that in adolescents size might well be related to function, and that the size of the sella, as

shown by uniform x-ray films, should vary with the size of the enclosed pituitary gland, attention was directed to the possibility that demonstrable variations might occur with menstrual anomalies.

Control material was provided by a group of young girls between eleven and eighteen years of age, who had no complaints but were examined in the course of a health contest, and by a smaller group of nurses who volunteered. None of these individuals had pelvic or menstrual complaints, other than mild dysmenorrhea, and the majority were subjected to a rectal examination to determine the absence of gross pelvic lesions. Among 90 such individuals, all but six had sellas measuring between 8 and 12 mm. in the greatest diameter. (Fig. 1.) None of the three with sellas under 8 mm. had menstruated, although



SMALL SELLAS

- No. 36 - 6 mm. 14 yrs. 4 mos. No menses.
 No. 54 - 6 mm. 14 yrs. 7 mos. No menses.
 No. 76 - 7 mm. 11 yrs. 6 mos. No menses.

Fig. 1.—Diameter of the sella turcicas in the control group.

two were fourteen years four months and fourteen years seven months of age, respectively, at the time of the examination. These latter girls were underdeveloped and resembled younger children in their general body proportions.

On the other hand, of the three girls with sellas 13 millimeters in diameter and presenting normal menstrual histories, only one showed normal physical development, the other two being unusually large; one, a girl of thirteen years, being 5 feet 2 $\frac{1}{4}$ inches tall and weighing 152 pounds, while the other, a nineteen-year-old nurse, was 5 feet 8 $\frac{1}{2}$ inches tall and weighed 182 pounds.

When the age of onset of menstruation in this control group is plotted against the size of the sella in millimeters (Fig. 2), a slight retardation is apparent in those with small as well as in those with

larger sellas (12 and 13 mm. in diameter). Perhaps some of these variations will disappear when a larger group is studied, as is planned for this year.

Twenty-one girls in the control group had not yet menstruated, of whom six had passed their fourteenth birthday. In two, the sella was 6 mm., in one 9 mm., and in three 10 mm. in diameter. Only one was normally developed, the others showing delayed appearance of the secondary sex characters and boyish figures. (Fig. 3.)

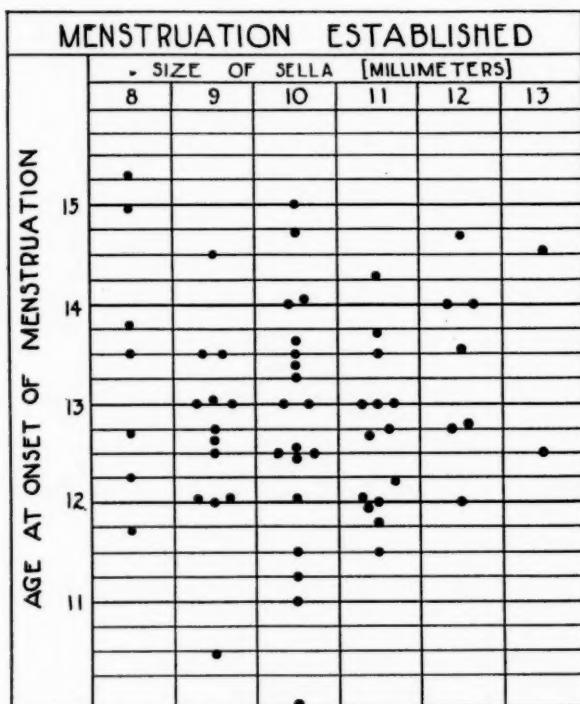


Fig. 2.—The age at onset of menstruation plotted against the size of the sella.

Among 13 young women with menorrhagia or metrorrhagia without established pelvic basis, there was only one who showed a sella less than 10 mm. in diameter, and her history placed her essentially as an amenorrheic with recently appearing menorrhagia. On the other hand, the five patients with secondary amenorrhea (no primary amenorrhoeas have been encountered since this study was begun) presented generally small sellas, only one being more than 10 mm. in diameter. In this latter instance, the amenorrhea developed after the girl entered the nurses' training school, following a relatively normal menstrual course beginning at the age of eleven years. These data are presented graphically in Fig. 4.

PHYSICAL PROPORTIONS

Physical characteristics have been studied through front and profile photographs, and by the various measurements of Berkow, through which surface area computations have been made according to his formulas. Well over a hundred individuals were studied as controls, the results indicating that, as the weight increases, the proportionate surface area of the head, hands, and feet diminishes while that of the trunk and thighs increases, and the arms and legs remain practically constant. Because of this variation depending upon weight, it has been

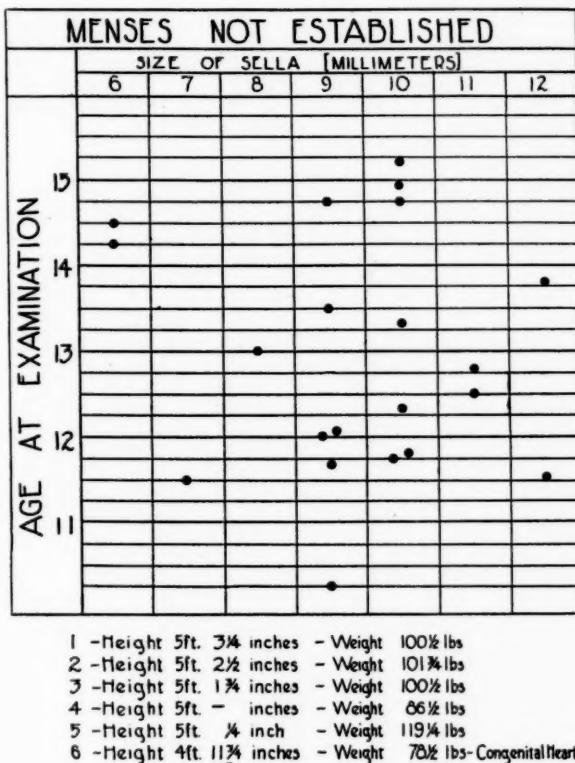


Fig. 3.—The size of the sella plotted against the age of 21 girls who had not yet menstruated.

difficult to obtain sufficient controls in all groups to establish significant averages, while among the pathologic cases the figures are altogether too scant to warrant discussion, except to intimate that so far no relationship has been demonstrated. Markedly pathologic conditions of the endocrine system produce changes in body configuration which may be almost pathognomonic, but in the patients here discussed the deviations from normal were slight and probably insignificant.

In these young women, the association of obesity with the menstrual disorders accompanied by lowered basal metabolic rates was not ap-

parent. There were only two in the pathologic group who were markedly overweight. They complained of menorrhagia and presented basal rates near normal, whereas there were six obese girls in the control group without menstrual abnormalities.

DISCUSSION

The data on basal metabolic rate determinations and on the histology of the endometrium in functional menstrual disturbances merely confirm what has already been pointed out. The fact that slight variations in metabolism may be associated with the menstrual anomalies

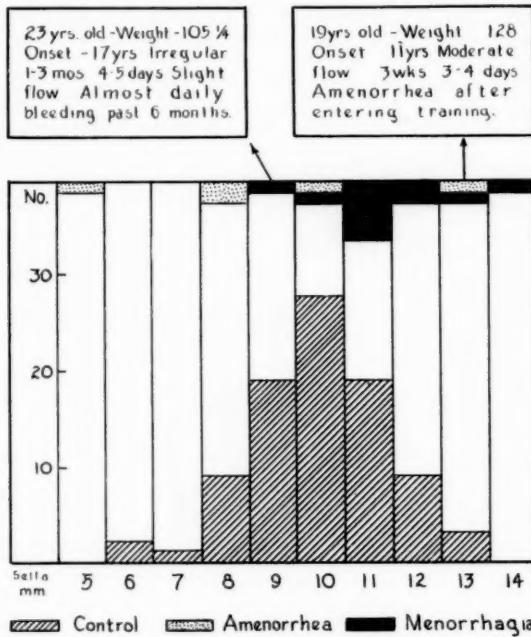


Fig. 4.—The size of the sella in representative cases of menorrhagia and amenorrhea.

adolescence is stressed. The therapeutic administration of thyroid extract frequently controls menorrhagia, but is less effective in relieving amenorrhea.

The evidence produced to show that the size of the sella turcica in adolescent girls is related to the activity of the pelvic organs as shown by the menstrual function is suggestive but not conclusive. Should further work demonstrate that such a relationship actually exists, it should be possible to effect a better differentiation between various functional disorders than is now possible.

It should be emphasized again that this study is incomplete and that no final conclusions are permissible.

HEMORRHAGE IN THE EARLY MONTHS OF PREGNANCY

By W. B. HENDRY, TORONTO, CANADA

HEMORRHAGE is one of the most common complications of the early months of pregnancy and, when present, it is usually significant of abortion, extrauterine pregnancy, or vesicular mole. More rarely it is a sign of cervical erosion, cervical polypus, or carcinoma of the cervix. It may also be the result of injury or tissue destruction through the application of mechanical or medicinal agents used for the purpose of terminating the pregnancy.

Then, too, there has been up until the present time a more or less widespread belief in the possibility of normal menstruation occurring during the first few months and even throughout the whole of the pregnancy. However, the modern conception of the physiology of reproduction and its relation to the menstrual cycle has done much to dissipate this belief. Biochemists throughout Europe and America have established beyond doubt the existence of two distinct hormones in the ovary; one from the whole ovary which prepares the uterine field for the reception of the ovum, and the other which is found after ovulation in the lutein tissue, which maintains the integrity of the bed in which the fertilized ovum is to lie. They have further established the fact of two hormones in the anterior pituitary body which lend a selective assistance to the two ovarian hormones in carrying out their work of preparation. Whenever an ovum escapes fertilization, the lutein hormone rapidly becomes exhausted and loses its control of the uterine mucosa; the endometrial bed breaks down and menstruation follows. When fertilization occurs and nidation commences, the lutein hormone takes on an increased activity, possibly as the result of stimulation from a trophoblastic hormone acting on it directly or through the agency of the anterior pituitary body. Consequently, the decidual bed in which the ovum lies remains undisturbed and menstruation does not take place. Accordingly, when uterine hemorrhage occurs in the presence of the known existence of pregnancy, it is logical to assume that there has been some interruption along the endocrine lines of communication, and that the resulting condition is one of threatened abortion and should be treated as such.

Of 610 cases of abortion admitted to the Toronto General Hospital during the last five years, an analysis showed that by far the largest number were self-induced by either mechanical or medicinal agents. Other causative factors were found present in the following order of

frequency: retroversion, syphilis, toxemia, subacute salpingitis, decidual endometritis, uterine myomas, pulmonary tuberculosis, deep cervical lacerations, and lobar pneumonia. Resulting complications were uterine infection, secondary anemia, pelvic inflammation with and without abscess formation, general peritonitis, septicemia, bronchopneumonia, subphrenic abscess, phlebitis, and pyometra. Complications present were cervical erosion, chronic endocervicitis, cardiac lesions, carcinoma of the cervix, acute cystitis, acute gonorrhreal urethritis, several gastrointestinal lesions, colloid goiter, ventral hernia, and ovarian cyst.

CASES OF ABORTION ADMITTED TO TORONTO GENERAL HOSPITAL FROM JAN. 1, 1925
TO DEC. 31, 1929. TOTAL NUMBER 610

CAUSATIVE FACTORS	NO.	RESULTING COMPLICATIONS	NO.	OTHER COMPLICATIONS	NO.
Selfinduction	90	Uterine infection	57	Cervical erosion	21
Retroversion	48	Secondary anemia	40	Chronic exocervicitis	10
Syphilis	10	Pelvic inflammation	21	Cardiac lesions	10
Decidual endometritis	5	General peritonitis	3	Carcinoma of cervix	3
Subacute salpingitis	5	General septicemia	5	Acute cystitis	2
Toxemias	5	Bronchopneumonia	4	Acute gonorrhreal	
Uterine myomas	4	Subphrenic abscess	1	urethritis	2
Deep cervical tear	2	Phlebitis	1	Gastrointestinal lesion	4
Pulmonary tuberculosis	2	Pyometra	1	Colloid goiter	1
Lobar pneumonia	1			Ventral hernia	1
				Ovarian cyst	1

The onset was gradual in about five-sixths of the cases and sudden in the remaining sixth. Hemorrhage was present in all cases and was the only symptom in 115 cases. It was followed by pain in 335 cases and was preceded by pain in 160. It was variously described as slight, intermittent or continuous, moderate or profuse, the amount varying in different cases and in the same case from slight to profuse, while in one-half of the cases it was accompanied by clots or clots and tissue. Except in the presence of infection the degree of collapse was in proportion to the amount and rapidity of the blood loss.

There was no record of pain in 115 cases. When present, it was almost invariably described as intermittent, cramp-like, varying in

CASES OF ABORTIONS ADMITTED TO TORONTO GENERAL HOSPITAL FROM JAN. 1, 1925
TO DEC. 31, 1929. TOTAL NUMBER 610

DIAGNOSIS	NO.	ONSET	RESULT	IMPROVED OR CURED	DIED
		SUDDEN GRADUAL	SUBSIDED ABORTED		
Threatened	68	14	54	68	-
Inevitable	35	3	32	35	-
Incomplete	385	65	320	379	5
Complete	120	31	89	115	4
Missed	2	1	1	2	-

Of these there were infected 97, with 5 cases of general septicemia and 21 cases gave a positive cervical smear of the hemolytic streptococcus.

intensity from slight to severe, and situated in the lower abdomen, being referred to the right lower quadrant in 5 cases and to the back in 3.

The majority of the cases admitted were classified as incomplete abortions, 385 coming under this head, 120 were complete, 68 threatened, 35 inevitable, and 2 missed abortions.

Of these cases 97 were found infected at admission, 5 having a general infection with positive blood cultures of hemolytic streptococci, and 21 giving a positive smear of the same organism obtained from the cervix.

The treatment varied with the condition of the patient on admission. For cases of threatened abortion our treatment in every case consisted of absolute rest in bed and sedatives as necessary to control pain, nervousness, or restlessness. Certain schools, principally European, advocate the use of strychnine and ergot where there is bleeding without uterine contraction, on the grounds that ergot will not start uterine contractions where they are not already established, and will tend to stop hemorrhage by increasing the uterine tonicity. Our difficulty is to determine where uterine contractions exist, for they may be present in the absence of pain, and thus far we have been content to wait and see, rather than to give any medication which might hasten the detachment of an already unstable ovum. Out of 68 cases of threatened abortion 57 subsided under this treatment while 11 aborted.

Where the abortion was considered inevitable or incomplete, our object has been to complete it by the safest and easiest means at our disposal. This we have done by one of three methods: ergot and quinine, packing the cervix and vagina with iodoform gauze for twenty-four hours, and dilatation and curettage. The first method, ergot and quinine, we used in cases of infection, or when the ovum or part of it was through the internal os; the second method, packing the cervix or vagina, where it was necessary to control hemorrhage, and also in conjunction with the first; the third method in all other cases. We do not curette an infected uterus except in cases of severe hemorrhage or where the uterine drainage is blocked by retained secundines.

In all cases where a curettage is decided upon we prefer the sharp curette rather than either the educated finger or the dull curette. In our opinion there is more damage done, first in dilating the cervix sufficiently to admit the finger, and second, in manipulating the uterus with the abdominal hand so as to enable the finger to reach every portion of the interior of the uterus, than can be done by the judicious use of the sharp curette. Then, too, with either the gloved finger or the dull curette one cannot be certain that all the retained secundines have been removed. In our opinion it is much safer and more effec-

tive to use the sharp curette carefully and then swab out the uterus with gauze soaked in either mercurochrome or tincture of iodine, and to pack the uterus lightly with gauze for twenty-four hours.

It has been our practice to treat all infected cases conservatively, while at the same time providing efficient drainage for localized pus. In cases of hemolytic streptococcal infection we have been using scarlet fever antitoxin intramuscularly where a positive smear has been obtained from the cervix, and intravenously where the infection has become general, supplementing it with blood transfusions in the latter cases. The results have been encouraging. We feel, however, that to effect a cure the antitoxin must be given early in the course of the disease. Three of the 5 patients with general septicemia, and a positive blood culture, died, but they had been infected three weeks previous to admission to hospital and did not respond to treatment. The other two were admitted within a few days following their infection and recovered. Of 16 cases with positive smears from the cervix all made an uninterrupted recovery.

CASES OF ECTOPIC GESTATION ADMITTED TO TORONTO GENERAL HOSPITAL FROM JAN. 1, 1925 TO DEC. 31, 1929. NUMBER OF CASES 69

Age from 19-42		Onset, sudden	21	Character of pain, none	3
Average age 30		Onset, gradual to sudden	27	slight crampy	20
Previous abortions	25	Onset, gradual through- (1-8)	18	severe	39
Parity,—0 para	15	Symptoms, pain before		Location, lower abdomen	15
1 para	26	bleeding	38	R.L.Q.	26
2 para	12	Symptoms, bleeding be-		L.L.Q.	23
3 para	4	fore pain	13	Rectum	1
4 plus para	12	Symptoms, pain without		Upper abdomen	1
Amenorrhea	none	bleeding	15	Bleeding, amount, none	15
	1 month	38		slight	33
	2 months	12	Symptoms, bleeding	moderate	16
	3 months	1	without pain	profuse	5
		Faintness and collapse		Color, dark brown	27
		with accompanying		unclassified	27
		pain	25	clots	6
		Nausea and vomiting			
		with accompanying			
		pain	20		

With regard to ectopic gestation there were 69 cases admitted to the hospital in the last five years, the youngest being nineteen and the oldest forty-two years of age, with an average age slightly over thirty. Fifteen were nulliparous, 26 primiparous and 28 multiparous while 25 had had from one to six abortions. Eighteen had not missed a period; 42 had missed one; 8 had missed two and 1 had missed three periods. In 11 the number of periods missed was not stated. The onset was sudden in 21, gradual in 18, and gradually approaching a sudden attack in 27. It started with hemorrhage in 13 and with pain in 53. Fifteen had no vaginal bleeding before admission to hospital. Thirty-nine gave a history of slight to moderate bleeding, continuous or intermittent for periods varying from a few hours to seven

weeks, while 5 had profuse intermittent bleeding for a few days before admission. In 27 cases the blood was described as dark brownish in color, while it was unclassified in the remaining 27. In no case was there any evidence of a decidual cast.

There was no pain in 3 cases, slight and crampy in 20, sharp and severe in 39, dull aching in 7. In 15 cases it was referred to the lower abdomen; in 26 to the right lower quadrant; in 23 to the left lower quadrant; to the rectum in one and to the upper abdomen in one. Painful defecation was noted in 2 cases and in 2 there was painful and difficult urination. Nausea and vomiting accompanied the pain in 20 cases while in 25 there were fainting and collapse to a degree out of all proportion to the amount of the external hemorrhage.

CASES OF ECTOPIC GESTATION ADMITTED TO TORONTO GENERAL HOSPITAL FROM JAN. 1, 1925 TO DEC. 31, 1929. NUMBER OF CASES 69—DIAGNOSIS CHANGED IN 3

Operative Findings, Complications and Special Treatment

Type, Unruptured	27	Complications	
Ruptured	35	Causative, Pelvic inflammation	5
Tubal abortions	3	Uterine myoma	1
Intraligamentous hematoma	1	Ovarian cyst	3
Abdominal pregnancy	1	Other, Secondary anemia	20
Unclassified	1	Retroversion	1
Situation, Rt. ampulla	30	Ventral hernia	1
Lt. ampulla	26	B. C. coli infection	1
Rt. isthmus	2	Treatment, Abdominal section	66
Lt. isthmus	1	Autotransfusion	13
Rt. tubal abortion	2	Direct transfusion	5
Lt. tubal abortion	1	Indirect transfusion	3
Rt. fimbria	1	Result, Recovered	62
Unclassified	3	Died	4

There were 27 unruptured tubal pregnancies. Thirty-five had ruptured intraperitoneally and 1 extraperitoneally, while there were 3 tubal abortions, 1 abdominal pregnancy and 3 cases in which the diagnosis was unconfirmed. Twenty-six were situated in the left and 30 in the right ampulla; 1 in the left and 2 in the right isthmus; 1 intraligamentous on the left side; 1 left and 2 right tubal abortions, while the abdominal pregnancy was attached to the fimbriated extremity of the right tube.

A comparison of these statistics with those for abortions shows that in 20 per cent of all cases considered, the signs and symptoms regarding the character of onset, type and amount of hemorrhage, and the description, severity, and location of pain were almost identical. It will be seen, then, that in many cases a differential diagnosis between these two conditions is extremely difficult. As a rule, however, abortion is more frequently gradual in its onset and ushered in by uterine hemorrhage which is usually more profuse, dark red in color, and accompanied by the passage of clots, while it is followed by pain which is moderate in severity, cramp-like in character, and definitely referred to the midline of the lower abdomen. Ectopic gestation, on the

other hand, is more frequently sudden in its onset, commencing with pain which is sharp and severe and referred to one or other side of the abdominal region, while it is followed by uterine hemorrhage which is usually small in amount and often dark brown in color. In abortion collapse is not marked, and is usually in proportion to the amount and rapidity of the blood loss, while in ectopic gestation the collapse is out of all proportion to the amount of visible hemorrhage.

A bimanual examination does much toward clearing up the diagnosis, except when old pelvic inflammatory lesions are present. When in doubt, an examination under anesthesia is advisable, at which time a posterior colpotomy may disclose blood in the pouch of Douglas, and a quick section of endometrial tissue may show the presence of decidual cells with or without chorionic villi.

When the diagnosis of ectopic gestation is confirmed, the only line of treatment to follow is operative. The abdomen should be opened, the bleeding point secured, and both the gestation sac and tube involved should be removed.

During the past few years whenever we have found a quantity of free blood in the abdominal cavity, it has been our custom to strain this blood through sterile gauze and return it to the circulation intravenously in a normal saline solution. In the present series autotransfusion was carried out in 13 cases, and proved of value in lessening the anemia and shortening the convalescence.

Of the abortions admitted there were 11 deaths, giving a mortality percentage of 1.98.

With regard to vesicular mole, this condition is rare in our experience. During the last ten years only 11 cases were admitted to the hospital wards, 3 of which were private patients. Of 8 cases in which the records were complete, hemorrhage was present in each one. It was described as scant, slight or moderate, and irregular in 4, and moderate and continuous or profuse with clots in the remaining 4. The characteristic vesicles—"white currants in red currant jelly"—were found before operation in only 2 cases.

Dull crampy pain in the lower abdomen was described in only 1 case, while in the remaining 7 there was no associated pain. Nausea and vomiting were severe in 4 and absent in 4 cases. The striking feature about this condition was that the severity of the nausea and vomiting was inversely proportional to the amount of the hemorrhage. When the hemorrhage was from moderate to profuse with the passage of clots, the nausea and vomiting were absent, and when the hemorrhage was slight, the nausea and vomiting were severe and resistant to intensive treatment.

Two of these patients had missed one period, 4 had missed two and 2 had missed three, but in each case the size of the uterus was described as that of a four to five months' pregnancy.

All of these patients were operated upon, 6 by means of a careful dilatation and curettage. In the seventh an abdominal hysterectomy was done, owing to the presence of a large fibroid. This patient died three days later from pulmonary embolism.

In the last case I was tempted to do an abdominal section, more through fear of being unable to clear out the uterus completely from below than for any other reason, and found that the clearing out of all vesicles was much more quickly and satisfactorily done than from below. However, I am not prepared to advocate this method as a routine treatment.

Postoperative observation is absolutely necessary in all cases of vesicular mole, on account of the danger of choriocarcinoma. Three members of this series were curetted within six weeks after discharge from the hospital and in two a few vesicles were recovered. All patients were kept under observation for a year and showed no further signs of trouble.

Concerning the remaining conditions which may give rise to hemorrhage in the early months of pregnancy, one may lay down the principle that all cases should be investigated in order to determine the lesion which is responsible for the bleeding. Where it is due to erosion of the cervix, the small electrocautery may be used with discretion, care being taken not to approach the internal os. Cervical polypi may be snared off and hemorrhage controlled by cauterization, but where carcinoma of the cervix is present, a therapeutic abortion should be done and adequate radium treatment given.

MEDICAL ARTS BUILDING.

Berrhun, E.: Kraurosis Vulvae. Arch. f. Gynäk. 134: 578, 1928.

The author finds that there are three stages of this disease. First there is an hypertrophic stage with sclerema and pressure atrophy in the papillae; second a retrogressive stage with retrogression of the edema and regeneration of the granulation tissue of the atrophic cutis and finally the atrophic stage with scar formation. The author does not believe that kraurosis exists without leucoderma. In typical kraurosis vulvae there is always a definite depigmentation.

RALPH A. REIS.

ACCIDENTAL HEMORRHAGE—ABLATIO PLACENTAE

BY JOHN OSBORN POLAK, M.D., BROOKLYN, N. Y.

(*From the Clinic of the Long Island College Hospital*)

ABLATIO, partial or complete separation of the normally situated placenta, occurs as a comparatively frequent accident in the last weeks of pregnancy and in the course of labor. It is one of the gravest conditions met with in obstetrics, for it is often attended with alarming hemorrhage, shock, and collapse; and the fetal mortality ranges from 65 to 95 per cent.

Frequency.—Ablatio, according to Holmes, is more common than placenta previa. The frequency has been variously estimated at from 1 in 115 to 1 in 894 labors. Holmes claims that many cases are missed, as the bleeding may be slight and examination of the placenta, casual or careless. He places the incidence at 1 in 200. Study of our records tends to support Holmes' claim, for in this series of 4,878 consecutive labors ablatio occurred 16 times, an incidence of 1 in 305. These figures represent only those cases which were diagnosed as ablatio before or during labor and which required treatment, but do not include many cases in which the separation was so slight that no clinical significance was attached to the vaginal appearance of blood at some time during the labor, but in which on routine examination of the placenta, evidence of premature separation of the placenta was apparent. Furthermore, we are convinced from our studies that this accident accounts for a fair proportion of intrapartal fetal deaths.

Ablatio placentae may be apparent or concealed. In the apparent type the lower margin of the placenta is detached and the blood separates the membranes from the uterine wall and is discharged as a frank hemorrhage through the cervix and the vagina, increasing at the time of uterine contraction. *Even in the apparent type the hemorrhage is primarily concealed*, which fact must not be overlooked, for the classical symptoms of ablatio are evident before vaginal bleeding appears. In the concealed type the effused blood collects within the uterine cavity and any one of the following conditions may obtain:

1. The placenta may become detached at the center and the periphery remain adherent. Such a detachment produces a node or boss on the surface of the uterus over the site of the retroplacental blood clot, with resulting uterine asymmetry. The overlying uterine area is exquisitely sensitive and atonic.

2. The placenta may become detached at one edge, upper or lateral, which allows the effused blood to lift the membranes from their uterine attachment. As the blood accumulates, it further separates the placenta and overdistends the uterus.

3. The placenta may be detached at one edge, partially lifting the membranes beyond the margin when the pressure of the accumulated blood may be such as to cause rupture into the amniotic sac above the placental site and allow the hemorrhage to produce an intraovular distention of the uterus.

4. Finally, separation may take place at the lower edge of the placenta and of the adjacent membranes, but owing to the ball valve action of the fetal head which occludes the lower segment of the uterus, the blood may be prevented from escaping. It is in this type of case that upward displacement of the presenting part confirms the diagnosis by allowing the escape of blood and blood clots.

Causes.—These may be grouped into those which are predisposing and those which may be considered as exciting. The predisposing causes are *toxemia*, *torsion*, and *endometrial* disease.

It is a well-known clinical fact that the placental attachment at or near term is a very loose one due to the fatty changes which are going on in the placenta preparatory to labor. This condition is necessarily exaggerated when certain placental areas are the seat of numerous infarcts. Chronic nephritis and hematogenous infections during pregnancy produce infarcts. Premature separation does not occur in true eclampsia, though the uterus is frequently in tonic spasm. In contrast it is relatively common in the chronic nephritic patient or in the woman who gives a history of antepartum infection. Both Kellogg and Young have called attention to the marked toxic symptoms which are present in many cases of ablatio, and Young has attributed these to the presence of the red infarct and blood resorption.

Uterine torsion is probably the next most common predisposing factor. There is some degree of uterine torsion present in every pregnancy; when this is extreme, there is definite blocking of the return venous circulation which produces minute hemorrhages in the spongy layer of the decidua basalis, which loosens the placenta so that with the occurrence of active uterine contractions, separation takes place. In cases of extreme torsion towards the right, placentas located on the left lateral wall of the uterus are more liable to separate than those having a right-sided attachment. I believe that torsion with the consequent engorgement of the uterine tissues is a factor in the etiology of both abortion and premature separation. This opinion is based upon the clinical fact that since I have taught my patients to take the knee-chest position for ten minutes three times a day throughout pregnancy, the incidence of both of these conditions, in my personal practice, has diminished. As soon as the diagnosis of pregnancy is made, each patient is drilled in the manner of assuming the knee-chest posture and in the method of distending the vagina with air when in this posture. At each revisit my nurse has the woman take this position and corrects any errors in this performance.

We have produced in animals placental separation by excessive torsion of the uterus and by ligation of the uterine and ovarian veins on one side. Similar experiments were done by Morse and reported to the American Gynecological Society.

Endometrial disease is a more common cause of abortion and placenta previa than it is of premature separation, though there can be no doubt that it figures in the etiology of ablatio, and, furthermore, multiparity favors endometrial hyperplasia. Among the exciting causes may be mentioned direct trauma, such as kicks, falls, blows, and violent muscular effort, such as the lifting of heavy weights. The fact that trauma actually figures in the causation of this accident is illustrated in our records of admissions, for among the working class most of our cases were admitted on Saturday or Monday nights, with histories of sexual trauma or of doing a heavy wash or lifting a portable wash tub. Another group occurred in summer during the excursion season when blows upon the abdomen in boarding an open car are relatively common. During the period when it was fashionable to use pituitary extract to expedite the first and second stages of labor, ablatio was more frequent.

The experimental observations on animals by Browne at the University College in London, confirms the clinical impressions of the importance of nephritis. Browne showed that if chronic nephritis has been caused by a previous injection of sodium oxalate, accidental hemorrhage can be induced by injection of uranium nitrate followed by an injection of *Bacillus pyocyaneus*. Provided chronic nephritis is present, there is no need to inject uranium, as hemorrhage can be induced by an injection of *Bacillus pyocyaneus* alone. In contrast, he found that in the absence of chronic nephritis, injections of *Bacillus pyocyaneus* are not usually sufficient to cause hemorrhage, even though the injections of the organisms have caused an acute nephritis. On the other hand, in three animals suffering from chronic nephritis, spontaneous antepartum hemorrhage occurred in the second half of pregnancy,—in one of these it occurred twice and in another four times in successive pregnancies. In all of the animals suffering from experimentally produced chronic nephritis the liver function was normal. He concluded that all evidence goes to show that the one important predisposing cause of accidental hemorrhage is chronic nephritis. Clinically, ablatio may be the first sign of a latent chronic nephritis. In further support of chronic nephritis being the chief underlying cause, O'Connor reports 37 cases in which the symptoms of toxemia were present in 33.

Symptoms.—Ablatio commonly occurs in the last weeks of pregnancy or during the first stage of labor. Usually the first symptom is *sudden and severe abdominal pain in the region of the uterus*, at the point of separation; this is always attended with some degree of faintness or collapse. This in turn, may be followed in the apparent type by a

vaginal discharge of blood, or the escape of blood may be the first sign of the accident. In the concealed variety the blood collects between the placenta, adjacent membranes and uterine wall, and causes stretching of the uterine muscle. In the presence of this foreign body, the coagula, the uterus is stimulated to tonic contraction. The board-like ligneous uterus is exquisitely sensitive to touch, which is diagnostic. The pain is constant and very intense; it may be cramp-like, colicky, or bearing down in character with no intervals of cessation as in normal labor. *Some degree of shock always exists* even when there is no great loss of blood, as evidenced by pallor, perspiration about the mouth and forehead, fall in systolic pressure, and change in the rate and character of the pulse. The signs of hemorrhage, whether the bleeding is concealed or apparent, are always progressive. Hourly hemoglobin estimations, repeated red cell counts, and frequent pulse and blood pressure readings give an index of the amount of blood loss and its effect on the woman. Occasionally in the concealed form a node or boss forms on the uterine surface, causing asymmetry; this corresponds to the site of the retroplacental blood collection. This swelling is always excessively tender, the retained massed coagula change the shape of the uterus, and it may rapidly increase in size. In the apoplectic form an effusion of blood may take place into the bundles of uterine muscle fibers, separate them and impair their power of contraction, hence the labor pains are of poor quality but the uterine pain persists. In the presence of this pathologic change the prognosis is most serious for retraction and contraction does not take place and bleeding continues.

The persistent escape of blood serum by the vagina is a symptom of great significance, as it indicates the presence of clots retained within the uterus. The amount of separation is shown by the effect on the uteroplacental circulation; in slight detachments during labor the fetal heart may not be disturbed but as the separation increases the heart tones are feeble, irregular, or absent.

Diagnosis.—An early diagnosis is all important and should be made before alarming symptoms develop. The woman, usually a multipara at or near term or in the first stage of labor, having some evidence of chronic nephritis, such as a high systolic pressure, edema, or albuminuria, is seized without warning with sudden severe abdominal pain. This is referred to the region of the uterus or just above the pubis and is associated with faintness, pallor, or some degree of shock. Or the first sign may be uterine pain and vaginal bleeding. Such a story at once suggests ablatio. Abdominal examination at this time will reveal a sensitive ligneous uterus with no periods of relaxation. By vaginal touch the cervix and lower segment seem pressed down into the vagina, giving prominence to the vaginal part of the uterus, though the presenting part may be above the brim. Upward displacement of

the presenting part may allow the escape of blood and clots. When bleeding occurs in the later months of pregnancy or during labor, it must be differentiated from placenta previa, uterine rupture, and premature labor. Bleeding from low implantation of the placenta may be easily mistaken for accidental hemorrhage, except that in the former the onset is painless and on pelvic examination we find the classical signs of previa. Rupture of the uterus occurs later in labor; the membranes have usually ruptured and there are other signs of protracted labor and disproportion or else there is a history of a previous myomectomy or cesarean wound. It is attended with a cessation of labor pains, *recession of the presenting part, diminution in the size of the uterine tumor, and when complete, with the development of a separate abdominal tumor.* Premature labor may be attended with slight vaginal bleeding but has none of the diagnostic signs of the more serious lesions.

Prognosis in ablatio is always serious, less so in the apparent variety than when the bleeding is concealed, for frank vaginal bleeding always alarms the woman or her family and prompt medical aid is sought. The condition can be readily recognized and proper treatment instituted. In the concealed type the mortality is much higher, as often the accident is not recognized until the woman is in a serious condition. The maternal fatalities result from hemorrhage, trauma, shock, and sepsis, and range, according to available statistics, from 2.6 per cent to 66 per cent. In the study of these figures it is interesting to note that the mortality rate in hospitals having a prenatal clinic, is materially lower than in those institutions with emergency services. For example, Greenhill at the Chicago Lying-In Hospital, had but 3 deaths in 82 cases, and Burgess at the Montreal Maternity Hospital had 6 in 801, while our ratio was 1 in 16. The fetal mortality varies from 60 to 95 per cent chiefly from asphyxia due to interference with the uteroplacental circulation. The chances for both mother and fetus are better in multiparous births than in primiparous labor. Any operative procedure on a patient in shock or in the presence of pronounced anemia is extremely hazardous. The prognosis is also in a degree dependent upon the form of treatment instituted. In the 16 cases of frank separation which are the basis for this paper, but one mother died, and her death can be charged to the manner in which her case was handled.

Treatment.—As soon as a diagnosis of ablatio is made, treatment must be instituted. What plan of procedure is to be adopted will depend upon certain obstetric factors; i.e., (1) the period of gestation; (2) the parity of the woman; (3) whether or not the woman is in labor; (4) the condition of the membranes; (5) the condition and the amount of dilatation of the cervix; (6) the amount of blood loss; (7) the general condition of the patient, and finally, upon the presence or absence of infection. A woman should be considered potentially in-

fected when she has had vaginal manipulations, through an unprepared vulva. The general indications are to empty the uterus and control the hemorrhage—but how?

General Considerations.—When the accident occurs during pregnancy with a nonviable fetus, the treatment is similar to that of an inevitable miscarriage and depends upon the degree of dilatation and the amount of bleeding. When it occurs in the latter weeks of pregnancy or during labor, the indications are to combat shock and control further bleeding. This is done by a hypodermic of morphine, the application of heat to the body, and the intravenous injection of 50 e.e. of a 50 per cent gum-glucose solution. Before injecting the glucose, the pulse and systolic pressure should be taken and recorded, the hemoglobin and red cell count estimated, and the blood grouped and matched for transfusion. *It should be accepted as a general rule that no operative procedure on a bleeding case be undertaken, before a blood transfusion is given.* Furthermore, it should be remembered that the employment of a general anesthetic immediately after transfusion produces biochemical changes in the blood which may be serious to the patient; hence, operative procedures done under local anesthesia and analgesia have an advantage. The hemorrhage is controlled by emptying the uterus and with the postpartum pack. When this accident occurs in the presence of a living viable child, in a primipara with unprepared soft parts, not in labor or in the first stage of labor, blood transfusion followed by cesarean section under local infiltration anesthesia should be the procedure of choice. Unfortunately, it is but seldom that such conditions obtain, for in the patient in labor with either apparent or concealed bleeding, a ligneous uterus and dilating cervix which is seen soon after the accident has occurred, the conservative plan of treatment has given us the most satisfactory results. For the woman in shock who has sustained any considerable blood loss will not stand trauma or anesthesia.

The conservative plan employed in the management of our cases is as follows: The pain and shock are relieved by a hypodermic injection of $\frac{1}{4}$ or $\frac{1}{2}$ grain of morphine; the vulva is clipped and scrubbed, and the vagina sterilized by the instillation of a 4 per cent mereurochrome solution. The membranes are ruptured and the vagina is firmly packed with soaked gauze; the vagina and fundus are carefully measured, and a Beek abdominal binder to control further uterine distention is firmly applied. If the presenting part is in the pelvis and there is no bony disproportion, 3 minim doses of pituitary extract are given hypodermically at twenty-minute intervals. The pulse, systolic pressure, hemoglobin, and red cell count are watched by half-hour and hourly readings. If the labor is progressing, as shown by the effacement and dilatation of the cervix and the descent of the presenting part and the quality of the pulse, the systolic and hemoglobin readings are maintained, the

patient is allowed to deliver spontaneously or the labor is terminated with low forceps. As the child's head passes the vulvar ring, a hypodermic of $\frac{1}{2}$ an ampoule of pituitary extract is given and the uterus followed down with the hand on the fundus; the placenta is then expressed with the first contraction, or if there is any delay, it is removed manually, and the uterus is emptied of its retained coagula, when it usually contracts and controls further bleeding. We have, however, seen it fail to do this; so it has been our custom to pack it firmly with iodoform gauze, as continued oozing may change the favorable outcome. With the hemorrhage controlled, our attention should next be given to combating the acute anemia and its effects by posture and blood transfusion. When, however, the conservative plan fails to arrest the intrauterine bleeding and the uterus becomes overdistended with blood or the condition of the cervix offers an obstruction to speedy spontaneous delivery, conditions which are quickly recognized by rise in the pulse rate, drop in systolic pressure, fall in the hemoglobin percentage, and increase in the size of the uterine tumor, or the cervix fails to efface and dilate; radical measures must be taken without delay. These predispose that the patient is in a well-equipped hospital where she can have the benefit of modern scientific methods. Under such conditions her blood should be cross matched (it has already been grouped) and a blood transfusion of at least 500 c.c. given by either the Unger or Soresi method. While this is being done, the abdomen is prepared, quickly opened under local infiltration anesthesia, and the child delivered by hysterotomy. When it is possible to eventrate the uterus before incising it, the operation can be shortened and further blood loss absolutely controlled by placing two long Keith clamps on the broad ligaments, thus clamping the uterine and ovarian arteries before opening the uterus and delivering child and placenta. This seems to prevent the shock which is apt to take place when the uterine contents and the mass of accumulated coagula are removed. Theoretical objection is made to this procedure on the grounds that it takes away all chance for the child, necessitates a larger abdominal incision, and sacrifices a uterus which possibly might be saved. These objections do not counterbalance the advantages, for section followed by hysterectomy is only indicated in those few cases where the separation is complete, where hemorrhage into the muscle fibers and hemorrhagic effusion under the peritoneal covering of the uterus has taken place. Such cases demand a rapid hysterectomy.

Case 15 of this last series falls into this group: A multipara aged thirty-eight years, mother of eight living children, was admitted to our service in March, 1930, about six hours after the first signs of separation. She was in severe shock with a pulse of 100, a systolic pressure 80/50, and a hemoglobin of 55 per cent. The uterus was tonic and the cervix, which was hard and scarred, admitted two fingers. The resident physician gave her morphine, ruptured the membranes, and applied the Beck binder. Her blood was examined for control, she was grouped,

and donors were called. After cross matching, a blood transfusion of 500 c.c. was given which raised her hemoglobin to 60 per cent and her systolic pressure to 120. The vagina was then tightly plugged and she was watched for two hours, when it was noted that her pressure had fallen to 70 and the hemoglobin to 30. The head did not fill the lower segment and the cervix showed no sign of effacement or further dilatation. She was given another transfusion of 800 c.c., and under an additional dose of morphine and infiltration anesthesia, the abdomen was opened, the child delivered by hysterotomy and the uterus removed. Immediately on clamping the broad ligaments the quality of the pulse began to improve and was of fair quality at the end of the operation. After putting her back to bed, a third transfusion of 500 c.c. of blood was given. Her recovery was afebrile and uncomplicated. Pathologic study of the uterus and adnexa which were removed, showed a deep bluish effusion of blood into all of the cellular tissues under the peritoneum and a wide separation of the folds of the broad ligaments by effused blood. More detailed investigation showed the muscle bundles of the uterine wall separated by masses of red blood cells. This case illustrates the value of frequent pulse, pressure, and hemoglobin readings as an index of what is going on within the uterus, and also of the enormous quantity of blood which has to be replaced in some of these separations, as well as the tolerance of the woman to properly matched new blood in acute hemorrhage.

TABULATION OF SIXTEEN COMPLETE SEPARATION CASES
Incidence 16 in 4,878 Consecutive Labors

<i>Mortality:</i>	
Maternal (age from 20 to 43 years)	1
Primipara	3
Multipara	13
<i>Mortality:</i>	
Fetal	14
<i>Period of Gestation:</i>	
At term	5
After eighth month	6
After seventh month	3
After sixth month	2
<i>Method of Delivery:</i>	
Spontaneous labor	12
Low forceps	2
*Manual dilatation and version	1
Hysterectomy	1
<i>Etiology:</i>	
Nephritic	7
Trauma	3
Syphilis	1
Cause unknown	5
<i>Presentation:</i>	
Vertex	14
Breech	2

*Fatal Case: Ruptured uterus, hysterectomy, after manual dilatation and version.

The one fatal case was the first in this series, death being due to a rupture of the uterus resulting from manual dilatation and version. The patient went into shock following the extraction, reacted on transfusion, but died in a few hours after a hysterectomy (under general anesthesia) to remove the traumatized uterus. A woman can stand the

loss of enormous quantities of blood if there is no tissue trauma. It is anesthesia and trauma that kill.

COMMENTS AND CONCLUSIONS

A review of the literature with a detailed study of the case histories in the two series which I have reported to this Association in 1922 and 1930, bring out certain clinical facts:

- (1) That minor degrees of ablatio are relatively frequent accidents and contribute to the uncontrollable part of fetal mortality.
- (2) That both clinical and experimental studies show chronic nephritis to be the most constant predisposing cause.
- (3) That the diagnosis is apparent from the history and the symptom-complex.
- (4) That the prognosis depends largely on an early diagnosis and the prompt establishment of rational treatment.
- (5) That trauma, blood loss, and toxemia reduce individual resistance—all three are commonly present in ablatio.
- (6) That the conservative plan instituted early with timely and generous transfusion offer the woman the best chance, and, finally, in those rare cases in which the uterine muscle bundles are infiltrated and blood effusion takes place into the subserous connective tissues, hysterectomy, under local anesthesia, after preliminary transfusion, is the procedure of choice.

20 LIVINGSTON STREET.

Jameson: Tuberculosis of the Female Pelvis. Am. Rev. Tuberc. 22: 72, 1930.

It is the general impression among workers in tuberculosis that renal and pelvic lesions are seen much less frequently among patients suffering from active pulmonary tuberculosis than in general hospital work. As a matter of fact in the last 38 autopsies on women who had died of tuberculosis in Saranac Lake not a single case showed gross evidence of pelvic tuberculosis, while in the last 24 salpingectomies done at the Saranac Lake General Hospital for all causes, 7 showed tuberculosis. From a thorough study of the extensive literature the writer concludes that tuberculous pelvic disease occurs in about 8 per cent of women with pulmonary tuberculosis, that the diagnosis can be made with a reasonable degree of certainty and that the roentgen rays offer a feasible type of conservative treatment. Surgery is best restricted to cases not relieved by other methods.

EHRENFEST.

PLACENTA PREVIA

BY ARTHUR H. BILL, M.D., CLEVELAND, OHIO

THE ultraconservatism in the practice of obstetrics which has been characteristic of the medical profession of this country has been much in evidence in the treatment of placenta previa. Reluctance to adopt measures which seem radical has no doubt in some instances served to retain a proper balance of obstetric procedure. However, in other instances it has retarded progress and definitely caused the continuation of high mortality by encouraging adherence to obsolete methods.

I fear that this is the case in the treatment of placenta previa. In view of the satisfactory results obtained, it has seemed to us that one of the greatest advances in modern obstetrics has been seen in the treatment of placenta previa, and yet results reported from some prominent clinics are most discouraging. An analysis of these reports shows that older methods are still in vogue and that practically the only difference between the methods of twenty-five years ago and of today, lies in the fact that the accouchement forcé has been almost universally given up. Rejoicing in the relegation of this most disastrous procedure to the scrap pile, we learn with dismay of attempts recently made to revive it disguised by a new name, the Delmas method, and masked by spinal anesthesia. If we were to eliminate from the statistics of twenty-five years ago the maternal mortality rate of accouchement forcé which was not uncommonly as high as 30 and even 60 per cent in cases of central placenta previa, and were to include in these statistics only the cases treated by Braxton-Hicks version and the cervical bag, we would find a maternal mortality of from 6 per cent to 13 per cent, averaging about 10 per cent. The average maternal mortality today where these same methods are used is probably about 10 per cent.

In cases of complete or partial placenta previa, that is cases in which the placenta definitely overlaps any part of the os, only three procedures are worthy of consideration. First, cesarean section; second, the cervical bag; third, the Braxton-Hicks version without extraction. In this country apparently the Braxton-Hicks version has never been popular and is very little used today. Abroad, however, it is still used somewhat extensively. However, the mortality rate for the mother from this method is seldom lower than 6 or 7 per cent and more often 10 per cent and the fetal mortality is naturally very high because the best results for the mother are obtained when no extraction is performed, the child being used merely as a tampon. With

its excessive mortality for both mother and baby this method should be considered only when facilities for better procedures are not available. As a last resort, in a place where there are no facilities for cesarean section, where no cervical bag or packing is available, a physician should bear in mind that by proper manipulation the baby can be used as a tampon to control hemorrhage. Such emergencies are rare and certainly would not arise in any locality within reach of a well organized medical center. In most instances it would be better to avoid all manipulation until proper help and facilities are available. The bag method would naturally offer about the same results for the mother as the Braxton-Hicks version without extraction and of course causes less fetal mortality.

The following are some characteristic reports of cases of placenta previa published during the last three years.

GROUP I. TREATED CHIEFLY BY OLDER METHODS

F. H. Lacey, 1929

Cases	562
Maternal mortality (Exclusive of cesareans)	8.88%
Fetal mortality (Exclusive of cesareans)	64.64%

J. Karstad, 1930

Cases	361
Maternal mortality	4.7 %
Fetal mortality	57.4 %

Summary.—Total cases, 2117; maternal mortality 9.68%

GROUP II. TREATED CHIEFLY BY CESAREAN SECTION

E. Frey, 1927

Cases	79
Maternal mortality	2.53%

M. Henkel, 1928

Cesarean section in primiparae and most serious cases	83
Deaths	1 or 1.2 %

DeLee, Unpublished Report

Low cervical section	44
No deaths	

A. H. Bill, 1927

Series "B"—Prophylactic blood transfusion and cesarean section	56
Maternal mortality (1 death)	1.78%
Fetal mortality	32.1 %

Summary.—Total cases, 262; maternal mortality 1.78%

The only uniformly satisfactory results are seen in the series of cases in which the procedure of choice was cesarean section and especially where combined with prophylactic blood transfusion in the more serious cases. However, I am not so much concerned with the reports in the literature as I am with the principles underlying the treatment of placenta previa and the reasons for the difference in maternal mortality rates between the older methods and the newer methods.

A placenta previa death is usually one from postpartum hemorrhage. There are two distinct reasons for these postpartum deaths: first, injury to the cervix and lower uterine segment brought about by manipulation necessary to extract the child through the birth canal; second, general atony of the patient or shock resulting from previous loss of blood and the effect of this condition upon the contractile power of the uterine muscle.

While better results are undoubtedly obtained by those methods which bring about a gradual dilatation of the os, such as the cervical bag or the Braxton-Hicks version without immediate delivery, it must again be emphasized that any method which causes a stretching of the placental site is very apt to give rise to postpartum hemorrhage even though there be no apparent laceration of the cervix. In a previous paper on placenta previa I illustrated this point with several cases treated by the bag method and in which death from hemorrhage had occurred. Autopsies showed no apparent laceration of the cervix in these cases and still there was bleeding from the placental site which was absolutely uncontrollable. In some such cases as these there is undoubt-

edly actual injury to the placental site not apparent in the vaginal portion of the cervix. In others probably the relatively poor contractile power of the lower segment of the uterus is not sufficient to control bleeding from the uterine sinuses when located in this part of the uterus. Clinically it has been our experience that when there has been no dilatation of the lower segment of the uterus and there is therefore no disturbance of the placental site, the baby having been extracted from above, postpartum hemorrhage from the placental site is practically nil. However, in any case in which there has been dilatation whether accomplished manually, by the baby or bag, there is an added element of danger of postpartum hemorrhage. It would seem, therefore, that the only safe method of delivery of the baby in cases of placenta previa is one which leaves the placental site undisturbed and of course the only method which will do this is abdominal cesarean section.

The second cause of postpartum hemorrhage deserves just as much consideration as the method of delivery. The delivery of a baby is never a bloodless operation. Therefore, the additional loss of blood caused by the delivery is very likely to throw a patient who has lost considerable blood into shock, even though she does not seem to be in this condition before delivery. We must also remember that loss of blood on the part of the patient causes an atonic condition of the uterine muscle which in turn causes further hemorrhage, all combining to develop a vicious circle. If in delivering a patient with placenta previa one does not anticipate the development of this vicious circle and prevent its occurrence by prophylactic blood transfusion the results may be disastrous even though the best method of delivery be used. All patients with placenta previa do not require blood transfusion and it is somewhat difficult to formulate a definite rule as to when to transfuse and when not to transfuse. However, it is far better to err on the side of safety than to encounter an uncontrollable postpartum hemorrhage. We are now accustomed to transfuse cases in which the systolic blood pressure is below 100 and in which the red blood count is as low as 3,000,000. Of course one must try to estimate the amount of blood lost and also take into consideration the general appearance of the patient and other evidence of impending shock. The rapidity of the pulse is of somewhat minor importance, for in some of these cases there is a moderately slow pulse even though the blood pressure is extremely low. In view of what I have said it must be clear that we are strongly in favor of the prophylactic blood transfusion rather than transfusion given after delivery, often as a last resort. The blood transfusion in these cases is given either immediately before the delivery or simultaneously with the delivery. In making a diagnosis we do not lay so much stress upon the variety of placenta previa as upon the mere fact of its existence. In other words

we make no serious attempt to distinguish between a central and partial placenta previa but feel that in any case in which there is placenta previa and hemorrhage with little or no dilatation of the os whether in primipara or multipara, cesarean section is indicated. We do, however, try to distinguish between placenta previa and accidental separation of the placenta, not so much that the treatment would be different in the two types of cases as that the differentiation helps in estimating the probable amount of blood which the patient has lost. For example in placenta previa the amount of external bleeding shown upon the patient's clothing or on the bed, closely corresponds with the total loss of blood; while in cases of premature separation of the placenta one might be seriously misled by a small amount of external bleeding and think that the patient had not suffered much loss of blood whereas the uterus itself might be filled with concealed blood. We make our probable differentiation between these two conditions chiefly by abdominal examination aided somewhat by rectal examination.

In placenta previa abdominal examination reveals practically the same condition as any normal case, and in most cases the fetal heart is still heard. In cases of premature separation of the placenta the abdominal findings are very different. The uterus is usually tense and somewhat distended and the fetal heart is not usually heard, never in cases of complete separation of the placenta. The location of the uterine bruit is also of considerable help in the diagnosis of placenta previa. It is often possible to trace this bruit into the lower uterine segment and across the symphysis pubis, whereas if the placenta is normally situated the uterine bruit is not heard over the lower uterine segment. On rectal examination it is usually possible to distinguish the thickened mass of placenta between the examining finger and the presenting part even though there is no dilatation of the os. We never attempt to make a diagnosis by vaginal examination. While the diagnosis of placenta previa made in this way is of course not as certain as if one inserted the finger into the os and actually felt the placenta, it is vastly more important to avoid all vaginal examinations than to make an accurate diagnosis of the variety of placenta previa. The diagnosis is invariably confirmed and the degree of overlapping of the os by the placenta determined during the operative delivery.

In view of our firm belief in the importance of keeping away from the placental site during the operation we have from choice performed the classical cesarean section. In cases which have been examined vaginally and in which there is a suspicion of infection, it is preferable to perform the low cervical operation or even the Porro operation. In two of the cases of our present series the Porro operation was performed for this reason. However, it is surprising how few contaminated cases of placenta previa we see. This can be attributed only to intensive teaching for many years that vaginal examinations

should not be made in cases of antepartum hemorrhage. Undoubtedly this policy quite generally followed in Cleveland is in a large measure responsible for our good results. All cases of antepartum hemorrhage should be in a hospital if one is available. It is safer to deliver immediately and this should always be done if the hemorrhage continues or if the baby is viable. However, there are a few exceptions to this rule, namely, those cases in which the first hemorrhage has promptly stopped and the patient is not far enough advanced in pregnancy to assure a living child. We sometimes allow a patient of this type to continue in her pregnancy but under the absolute provision that she be in the hospital and in bed. Rather than allow her to be at home and to be up we insist upon delivery. However, in a number of cases with thorough cooperation on the part of the patient it has been possible to allow the pregnancy to continue and eventually to deliver a living child.

The following statistics are from the Maternity Hospital of Cleveland. In 1927 I reported a series of cases delivered according to our present methods from January 1, 1922, to May, 1927. In this list there were 56 cases with one maternal death. In the present list I have brought this series up to July 1, 1930, as follows:

JANUARY 1, 1922, TO JULY 1, 1930

	Total deliveries	34,343
	Cases of placenta previa	104
	1 placenta previa in 330 cases	
104 cases of placenta previa	Complete	47
	Partial	27
	Marginal	30
	Cesarean section, classical	78
	Cesarean section, low cervical	2
	Cesarean section, Porro	2
	Podalic version (bag)	15
	Forceps	5
	Spontaneous	2
	Prophylactic blood transfusion and cesarean section	23
	Maternal deaths	2 or 1.92%
	Fetal mortality (Died 16; Stillborn 16)	32 or 30.76%
	Cases requiring blood transfusion	22.11%
	Cases delivered by cesarean section	78.84%

In this series of cases there was only one death from hemorrhage. This case was fully described in my previous paper on placenta previa and was largely attributable to the obstinacy of the patient's husband who not only refused to give his consent to delivery but also refused to act as donor for a blood transfusion. The patient was really moribund at the time of treatment.

The cases which were treated by version and forceps were those of marginal placenta previa in whom, at the time of the first definite hemorrhage there was sufficient dilatation of the os to permit delivery by these methods. In the five cases delivered by forceps, preliminary

rupture of the membranes, allowing the fetal head to descend into the cervical canal, was sufficient to control hemorrhage. These patients were chiefly multipara. It is interesting to note that our records show a continually decreasing number of cases treated in this way. In fact in the last half of this series only four patients were delivered by version.

While our chief interest is of course in the reduction of maternal mortality it is interesting to note that more than two-thirds of the babies were saved. In other words the methods which give the best results for the mother are also responsible for the lowest fetal mortality.

CONCLUSIONS

All cases of placenta previa should be treated in the hospital if possible and should be sent there immediately without vaginal examination or packing.

A careful estimation of the loss of blood should be made and in all cases of doubtful operative risk, prophylactic blood transfusion should be performed and sufficient blood given to insure the safety of the patient.

If there is little or no dilatation of the os, cesarean section should be performed whether the baby is alive or dead, for the viability of the child has no bearing on the choice of method for delivery.

If there is considerable dilatation of the os and the fetal head is engaged, simple rupture of the membranes may control hemorrhage until the baby may be delivered by forceps; or if the fetal head remains high, podalic version may be performed. These procedures should be used only in the marginal variety of placenta previa.

OSBORN BUILDING.

Mayer and Dejardin: Clinical Considerations of the Surgery of the Pelvic-Utero-Adnexal Sympathetics. Bruxelles Méd. 10: 125, 1929.

These authors feel that resection of the presacral, the hypogastric, or the ovarian sympathetics for the relief of certain types of pelvic pain has not received the attention which the procedure warrants. They report 10 cases in which one or more of these procedures has been carried out with success. In 4 cases the operation was done for severe intractable dysmenorrhea, while in one the pain was intermenstrual in type. In 3 others the indication was severe pain in inoperable pelvic carcinomas, and the operation was carried out as a palliative measure. Finally in 2 cases it was done to prevent pain which sometimes occurs following extensive operations for pelvic inflammatory disease.

THEODORE W. ADAMS.

PREGNANCY AND LABOR IN THE ELDERLY PRIMIPARA

A STUDY OF OVER 300 CASES

BY JAMES K. QUIGLEY, M.D., ROCHESTER, N. Y.

IT IS hard to understand why childbearing in the elderly primipara has been thought to be so very difficult and so fraught with dire consequences. This opinion prevails quite generally in the medical profession and is shared also by the laity, particularly by the parturient. Yet most of those who have written upon the subject believe, as I shall attempt to prove in this brief presentation, that not only is there little added risk to the mother bearing her first child after thirty years of age, but that the fetal mortality is no higher than that generally encountered.

Few textbooks discuss the subject, possibly because, in the opinion of their authors, labor differs so little in primiparae, young and old, as not to deserve special consideration. Williams¹ says, "Labor is usually more prolonged in elderly than young primiparae, that is after the thirtieth year." According to Ahlfeld it averages seven hours longer in the former though Varnier states that the difference is very much less. At the same time the latter author points out that forceps are much more frequently required in old primiparae.

DeLee² says "The best years for women to bear children are from eighteen to twenty-five. With added years the function of childbearing is attended with increasing difficulties although these are all exaggerated in the popular mind. In general it may be said that in older women the pregnancy disorders—hyperemesis, abortion and premature labor—are more frequent. Contracted pelvis, usually the *justo minor*, the infantile or the masculine types, are oftener met. Labor is longer in all three stages, premature rupture of the membranes, cervical and perineal rigidity are more common—indeed the soft parts may be so inelastic that they tear in all directions like old rubber, when stretched. Face, breech and shoulder presentations, occiput posterior positions and deep transverse arrest, are more frequent while the action of the uterus may leave much more to be desired etc., etc. All these retard labor and necessitate frequent recourse to forceps. They increase the danger to mother and child; for the one, lacerations and infections; for the other cerebral injury and death from asphyxia. Postpartum hemorrhage from lacerations and uterine atony have also been noted. Nursing is less likely to be adequate."

This rather gloomy view of the situation is not held by Berkeley and Bonny.³ "In our experience the course of pregnancy in a woman over thirty years of age differs but little from that in one under thirty. At most the labor is a little prolonged and necessity for operative delivery is rather more frequent."

The percentage of elderly primiparae seen in private practice is much greater than in public ward service. There are several probable reasons why this is so. First, private patients at this age are more apt to be in better financial condition. Second, the generally considered opinion that labor in this class of patients is very apt to

be difficult induces the patient to seek the services of a private physician, usually an obstetrician. Third, early marriages are more common among the less well-to-do. The incidence as found in this series was 234 in 2200 deliveries in my private patients or 10.5 per cent, as against 70 in 4106 ward patients or 1.7 per cent.

Age Grouping.—Rather than consider each age separately I have divided them into three age groups; viz., thirty to thirty-four inclusive, thirty-five to thirty-nine inclusive and those forty years and older. (Table I.)

TABLE I. AGE GROUPING

Age	PRIVATE PATIENTS													
	30	31	32	33	34	35	36	37	38	39	40	41	42	43
Number of cases	47	34	24	24	21	21	14	18	13	4	8	3	2	4
Group totals					148				69				17	
WARD PATIENTS														
Age	30	31	32	33	34	35	36	37	38	39	40	41	42	43
Number of cases	18	11	6	7	8	5	1	1	2	4	3	1	1	1
Group totals					50				13				7	

The number of cases included in the forty and over group is not large enough to consider seriously as a group, but the first two groups are worthy of consideration and the findings in the entire series are significant, particularly if they coincide with those of others who have written upon this subject. The available data concerning my private cases were more detailed than in the public ward cases, so a comparison of the two series is possible only in certain features.

Sex of the Children.—The sex of the children showed a preponderance to the male, 137 to 109; this is similar to Ahlfeld's estimate of 137 to 100 and Hecker's 133 to 100 in elderly primiparae.

Twin Pregnancies.—A greater frequency of twin pregnancies has been attributed to the elderly primiparae. Prinzing gives an incidence of 4.14 per cent (quoted from Spain⁴). "One to every 44 in elderly primipara as compared to 1 in every 224 before thirty" (quoted from Freedland⁵). In this series there were 3, or 1 to 101.

COURSE OF PREGNANCY IN ELDERLY PRIMIPARAE

Toxemia.—Nausea and vomiting and late toxemia of pregnancy are said to occur more often in primiparae over thirty. Of 232 women in this series 108 had no nausea or vomiting, 109 had slight disturbance from this complaint, usually of the morning type only, while 15 suffered to a moderate degree. There were no cases of true hyperemesis and none requiring hospitalization.

Of late toxemia there were one fulminating eclampsia at six months, 7 preeclamptics, 6 cases of moderate severity, and 22 mild cases.

	<i>Nausea and Vomiting</i>		<i>Toxemia</i>
None	108 or 46.5 per cent	Mild	22 or 9.0 per cent
Mild	109 or 46.9 per cent	Moderate	6 or 2.5 per cent
Moderate	15 or 6.8 per cent	Preeclamptic	7 or 3.0 per cent
Hyperemesis	0 or 0.0 per cent	Eclampsia	1 or 4.0 per cent

These findings are similar to those of Schulze.⁶ The percentage of nausea and vomiting differs little from the general average for all ages, including multiparae; the rate for toxemia, mild and severe, is probably considerably higher; nephritic toxemia, which was included in this series, might account for the higher incidence in older women.

Abortions and Premature Labors.—Interruptions of pregnancy, according to Williams, are more frequent in old primiparae. I do not believe this to be true of this group, for only 20 of the 234, or 8½ per cent, had had early abortions. There were 28 premature labors in this series due largely to toxemia of pregnancy; neither is this incidence of 1 to 11.7 much above the average.

Syphilis.—One patient gave a 4+ Wassermann test and only on going into her history very carefully was it found that she had had interstitial keratitis at the age of twelve, a symptom of congenital infection.

Fibromyomas of the Uterus.—There were only 9 cases in which fibroids were discovered. In 3 the growth was so extensive as to preclude pelvic delivery, and in another while the tumor was not sufficiently large to obstruct, we believed, after a thirty-hour labor, that the uterine musculature was so involved by multiple small fibroids as to prevent cervical dilatation and retraction; these 4 patients were delivered by abdominal section. In the remaining 5 the fibroids were no factor in pregnancy or labor. Fibroids are more common in the primiparae over thirty than in the young primiparae, but no more common than in multiparae over thirty.

Induction of Labor.—Thirty-seven patients responded to simple induction by quinine and castor oil. I believe that labor in these cases was shorter and there was less dystocia than in the labors which started spontaneously. The longest labor was twenty-six hours and thirty minutes, and the shortest was three hours and fifteen minutes, the average being eleven hours forty-five minutes. There were 5 bag inductions, 3 for toxemia of pregnancy, 1 for dry labor with inertia, and 1 in premature macerated fetus (placental infarction). I use the hydrostatic bag to induce premature labor less frequently than formerly in primiparae, because of the uncertainty of its action; furthermore, the infant mortality of labor induced by hydrostatic bags is higher than in spontaneous labor. For these two reasons I do not agree with Spain who suggested routine induction of labor by the hydrostatic bag at the thirty-sixth week in elderly primiparae. Induction by quinine and oil alone or by the Watson method at estimated full term has a distinct place in the management of primiparae, whether young or old.

Contracted Pelves.—Pelvic contraction, particularly of the male or funnel type, is said to be more common in old than in young primiparae. Of the 234 private patients there were 16 with flat pelvis, 4 justo minor, and 6 of the funnel type, a total of 26 or 11 per cent.

TABLE II. PRESENTATION AND POSITION

	30-34	35-39	40-46	TOTAL
Vertex				
L.O.A.	89	46	15	150 - 48.8 %
R.O.P.	45	14	3	62 - 20.0 %
R.O.A.	39	14	3	56 - 18.2 %
L.O.P.	13	5	1	19 - 6.1 %
Brow	2	0	0	2 - 0.65%
Face	1	0	0	1 - 0.32%
Breech	11	4	2	17 - 5.33%
Total				307

Malpresentations and malpositions are supposed to be more frequent in elderly primiparae. In Table II it will be seen that vertex presentations comprised 93.1 per cent of the total as against an estimate of 95 per cent for all cases (Karl Braun 48,449 cases, Schroeder 250,000 cases); a slight decrease in vertex presentations compensated for by an increase in the breech, 5.33 per cent for this series as against 2.7 per cent to 3.11 per cent (Braun, Schroeder). The rate for face presentation is the same as given by these authorities for all cases. Of the vertex presentations there is an increase in L.O.P. positions of 6.1 per cent against 1 per cent, with a probable slight increase in R.O.P. The large percentage of R.O.A. positions is due to the fact that diagnosis of position was made by the house officer at the end of labor rather than at the beginning in the ward cases. In short, the differences in this small series are: an increase in breech presentation of from 3 to 6 per cent and an estimated increase in posterior position of the occiput of 10 per cent.

TABLE III. LENGTH OF LABOR

PRIVATE CASES—207

	30-34	35-39	40-46	ENTIRE SERIES ALL AGES
Shortest labor	2 hr.	2 hr., 40 min.	7 hr.	2 hr.
Longest labor	51 hr.	48 hr.	26 hr.	51 hr.
Average	15 hr., 24 min.	14 hr., 54 min.	17 hr., 6 min.	15 hr., 20 min.
Spontaneous de- liveries no pre- matures	10 hr., 16 min.	11 hr., 30 min.	15 hr., 54 min.	11 hr., 0 min.

WARD CASES—62

Shortest labor	5 hr., 35 min.	4 hr.	8 hr.	4 hr.
Longest labor	65 hr.	24 hr., 15 min.	17 hr.	65 hr.
Average	20 hr., 45 min.	16 hr.	11 hr.	19 hr., 12 min.
Spontaneous de- liveries no pre- matures	14 hr., 46 min.	16 hr., 40 min.	12 hr., 28 min.	15 hr., 6 min.

It is in this table of length of labor in elderly primiparae that the surprises are found. I say surprises, for it is generally thought that these labors are unusually long. Eighteen hours are a fair estimate of the length of labor in all primiparae. The average of all cases, in this series, cesarean sections excluded, in the private group is fifteen and one-third hours. Lest it be thought unfair to include aided deliveries (forceps and versions) the duration of labor in the patients delivering spontaneously, excluding premature labors, was still lower; viz., eleven hours. In the ward service a much more conservative policy was pursued and the averages were respectively nineteen and fifteen hours. Edgar⁷ reported an average of fifteen hours and forty-five minutes in 30 spontaneous deliveries, and the Tarnier clinic reported seventeen and one-half hours for 111 elderly primiparae. Not infrequently labors are unusually short in primiparae between the ages of thirty and forty; for instance, in the age thirty-six group there were 4 labors totaling only twenty-one and one-quarter hours, an average of five and one-third hours. All were mature infants and all were unaided deliveries. One woman of forty delivered herself of a full-term child in eight and one-quarter hours.

TABLE IV. MODE OF DELIVERY OF 307 BABIES IN PRIVATE AND WARD PRACTICE

	30-34	35-39	40-46	TOTAL
Spontaneous	73 - 36.5%	29 - 35.3%	6 - 25.0%	108 - 35.1%
Forceps				
Low	37 - 18.5%	16 - 19.5%	7 - 29.0%	60 - 19.5%
Mid	62 - 31.0%	17 - 20.7%	6 - 25.0%	85 - 24.4%
High	4 - 2.0%	3 - 3.6%	0 - 0	7 - 2.2%
Cesarean section	13 - 6.5%	17 - 20.7%	5 - 20.8%	35 - 11.4%
Version	6 - 3.0%	0 - 0	0 - 0	6 - 1.9%
Breech delivery	5 - 2.5%	0 - 0	0 - 0	5 - 1.6%

It will be noted that there is a high percentage of forceps deliveries in this report; few of these were difficult, and for the most part were low or low-mid application which were done after it was noted that there was lack of progress after at least two hours in the second stage. My impression is that the characteristics of labor in an elderly primipara are a fairly short, satisfactory first stage, usually with delay in the second stage due either to a thick muscular perineum, or what is more common, to secondary inertia and sometimes to a combination of both. In some instances delivery by forceps was called for because of threatened fetal asphyxia.

Version was done but six times and then for special indications, such as brow presentation, lack of progress after a long time in a posterior occiput where delivery was demanded and cesarean section contraindicated, and in placenta previa.

High Forceps.—Forceps were applied to the unengaged head seven

times; in each case version and abdominal delivery were contraindicated. The fetal mortality of 4 cases or 57 per cent rightly condemns the procedure.

Cesarean Section.—Eleven per cent seems a rather high incidence of abdominal deliveries and yet I have heard the opinion expressed that every primipara over thirty-three or thirty-five years old should be so delivered as an elective measure. Eighteen of these cesarean sections were done only after a test of from eight to fifty-three hours of labor. Of the private case group there were only 9 abdominal deliveries done without a test of labor, as follows:

4 Purely elective	2 Preeclamptic toxemias
	2 Funnel pelvis
5 After labor had begun	2 Flat pelvis
	1 Extensive fibroid
	1 Cardiac (pulmonary stenosis)
	1 Funnel pelvis

Eighteen patients had trial labors of from eight to fifty-three hours, and most of them were real tests of labor; in each case the head remained high and the competing procedures were high forceps, version, pubiotomy and cesarean section. The exceptions to this were: threatened fetal asphyxia in a woman of thirty-eight for whom I am sure the choice of delivery made possible the birth of a living child, twin pregnancy in a toxic mother with premature separation of the placenta, large fibroids low in the uterus in two patients and small multiple growths in one, and primary inertia after thirty-six hours of labor in a woman who had had four spontaneous abortions. There were three cases of flat pelvis, one justo minor, and one funnel pelvis; one case of disproportion due to postmaturity. It is only in the remaining six cases where definite indications were lacking that it might be said that elderly primiparity was the chief factor in deciding for cesarean section.

The value of the child to these six women of thirty-five to thirty-eight years is great; in other words, their chances for a living baby are not as good as in the young primipara who may have many pregnancies, and one is not justified in assuming great risks in difficult deliveries. I believe that after a trial labor in uninfected patients, if the choice lay between high forceps, version, or low cesarean section the last method should be chosen. Cesarean section as an elective procedure before the onset of labor is not indicated except in the case that is complicated by some condition which would demand abdominal delivery in any patient, such as placenta previa, contracted pelvis, or premature separation of the placenta. Malpresentation, such as brow or face, or preeclamptic toxemia should indicate cesarean section more frequently than in the young primipara or multipara; in other words, I believe the relative indications are broadened in the elderly primipara.

RELATION BETWEEN STERILITY OR LOWERED FERTILITY AND DYSTOCIA

It has been claimed that women conceiving for the first time several years after marriage are prone to dystocia, because of inertia, slow dilatation, and rigid soft parts due to hypoplasia of the generative organs. The number of years married before conception was not known in many of these cases, but in the 100 private patients from whom this item was ascertained, the following facts were found.

TABLE V. LOWERED FERTILITY AND DYSTOCIA

	MARRIED 1 YEAR OR LESS	MARRIED 5-20 YEARS BEFORE CONCEPTION, AVERAGE 9½ YEARS
No. of cases	39	69
Cesarean sections	6 - 15.1%	9 - 15.0%
High forceps	2 - 5.1%	0
Mid forceps	9 - 23.0%	22 - 36.0%
Low forceps	6 - 15.1%	10 - 16.4%
Spontaneous	16 - 41.0%	20 - 32.6%
Average duration of labor	14 hr., 12 min.	16 hr., 24 min.
Infant mortality	5 - 12.5%	2 - 3.2%

There are two chief differences in these two groups: first, in the woman married five years or more before her first conception the labor was longer, and second, forceps were resorted to more frequently in the same class.

Weight of Babies.—The average weight of all babies, excluding prematures, was 7 pounds 8½ ounces, which would not corroborate the view that first babies born to older women were unusually large.

TABLE VI. LACERATIONS AND RESULTS

PERINEUM		CERVIX	
No laceration	46	Intact	49
Episiotomy	57	1° { stellate unilateral bilateral } 102	
1° laceration	45	2° { stellate unilateral bilateral } 36	
2° laceration	57	3° { stellate unilateral bilateral } 12	
3° laceration	1		

Results:

fine 104

good 82 meaning no relaxation of pelvic floor at all.

moderate 20 meaning some degree of relaxation discoverable on examination but without symptoms.

Laceration or the necessity for episiotomy may be slightly more common in elderly primiparae than in young primiparae, though I believe the difference to be trifling. The results, however, were quite good.

Dry labor is mentioned as a complication of these labors. This cannot be considered very seriously when we find an average length of 11.6 hours for 82 cases. This is between three and four hours shorter than the general average of the entire series. The percentage of spontaneous deliveries in the dry labors was the same as that for all labors; there were fewer cesarean sections and more forceps deliveries.

TABLE VII. AVERAGE DURATION IN 82 DRY LABORS OF ELDERLY PRIMIPARA

30-34	35-39	40-46	ALL AGES
11.1 hr.	11.8 hr.	13.8 hr.	11.6 hr.
DELIVERIES IN THESE DRY LABORS			
Spontaneous	15	11	29 - 35.5%
Low forceps	13	7	29 - 24.4%
Mid forceps	21	4	26 - 31.7%
High forceps	0	2	2 - 2.4%
Cesarean section	0	5	5 - 6.0%

Infant Mortality.—There were 12 deaths in 237 cases, or 5 per cent. This includes premature births. Five babies were dead before the beginning of labor (4 toxic cases and 1 placental infarction), 1 at six months, 1 at seven, 2 at eight months, and 1 at full term. These were macerated at birth. Of the remaining 7, 3 were delivered by high forceps, one was a breech delivery, one a placenta previa and finally eight months twins of a toxic mother with separation of the placenta.

SUMMARY

There still exists a more or less widespread feeling that childbearing in elderly primiparae is accompanied by a complicated pregnancy and a difficult labor, with an increased risk for the child.

There is a much higher percentage of elderly primiparae in private than in public hospital service.

The findings in this series of 234 private and 70 ward cases did not show more nausea and vomiting; did not show a higher percentage of twin pregnancies (1 to 101); did not show larger babies than the general normal (7½); did not show a higher incidence of abortions or premature labors; did not show more fibromyomas than in multiparae of the same age, and did not show a fetal mortality above the general average. Dry labors, if frequent, were shorter than those when the membranes ruptured later. The findings did not show an increase in the length of labor; as a matter of fact, the labors were shorter than in all primiparae by an appreciable length of time.

They did show a slight increase in toxemia of pregnancy, an increase in number of cases of funnel pelvis, only a slight increase in unfavorable presentations and positions, an increase in the necessity for cesarean section, but a few abdominal deliveries were done with elderly

primiparity as a sole indication (the cases of contracted pelvis would have demanded cesarean section had the woman been a young primipara).

There still is a small group of cases of first stage dystocia in which long labor will not dilate the cervix; many of these are due to primary inertia and only a few, in my opinion, to rigidity of the cervix. In some of these cases cesarean section should be done (6 cases in this series).

The usual dystocia seen in this series came after a satisfactory short first stage, with delay in the second stage due to inertia usually, but sometimes to a rigid pelvic floor. This explains the frequent resort to low or mid-low forceps extractions; the results as far as fetal mortality or condition of the pelvic floor was concerned were good. Elderly primiparae seldom have satisfactory lactation.

CONCLUSIONS

The management of labor in elderly primiparae is no different from that in young primiparae. A large proportion of these cases will permit of delivery through the pelvis, 89 per cent in this series. In only 2.9 per cent of these patients was the age of the patient the sole factor in deciding for abdominal section and, then, after a trial labor. Two measures; viz., analgesia during the first and second stage and the low cervical section facilitates a thorough trial labor after which it will be found that many patients, such as were formerly subjected to elective cesarean section, can be delivered by the pelvic route.

While pregnancy and labor in the woman having her first child after thirty carries with it an added risk to the mother and her baby, this hazard has been very much overestimated.

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THE TREATMENT OF HYPEREMESIS GRAVIDARUM

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IN A RECENT review of the current literature DeLee¹ somewhat pessimistically asks, "What have we learned the past year regarding hyperemesis? Nothing! Our treatment is the same as it was, rest in bed, isolation, forced fluids and glucose intravenously." J. P. Greenhill² in a similar review states in reference to a claim made that injections of an artificially prepared antibody of human placental extract have cured a series of 40 cases, "the reviewer wishes he could meet such a miracle man. He must, however, content himself with the customary treatment of this condition, namely, isolation, rest in bed, forced fluids and glucose intravenously."

The unanimity illustrated here has at least the advantage to those treating hyperemesis gravidarum that the confusion of theories and nostrums advocated a decade ago has disappeared and whatever the present limitations of therapy, the now commonly established views mark a real advance.

The essential cause of this condition is as yet unknown. Although we cannot claim to have a specific form of treatment, much has been learned by intensive study of these cases and forms of treatment have been evolved which are for practical purposes satisfactory.

In this paper will be described the treatment of hyperemesis gravidarum as carried out at the Burnside Department, Toronto General Hospital in the Metabolic Ward with the cooperation of the Department of Pathological Chemistry under the direction of Professor V. J. Harding.

In our opinion, all cases of nausea and vomiting of pregnancy have a common underlying cause which may show itself in various phases. No satisfactory distinction can be made between toxic and neurotic vomiting. Any test which is devised to do so merely marks a stage in the progress of the disease at which a certain function or organ is deranged. These derangements appear earlier or later in the disease, depending on the individual and the direction in which the disturbances of metabolism progress. A case progressing slowly with almost compensating changes occurring *pari passu* will correspond to what some have called "neurotic." In others, progressing very rapidly, the gross degenerative changes appear quickly, the earlier stages escape notice, and the case is called toxic from the beginning. From this point of view, we have accounted for the widely variant types of the disease by noting the type of metabolic disturbance which is some-

times the dominant type in a given case. Close investigation of vomiting of pregnancy has shown that these types of metabolic disturbance are factors in the development of the disease and that upon their presence and the degree to which they are acting depend the clinical features and progress of the disease.

That a disturbance of the carbohydrate metabolism is a common feature is now accepted as a truism, although there may still be differences of opinion as to the interpretation of the obtained facts. The theory of carbohydrate deficiency as the primary cause of nausea and vomiting was first stated by Duncan and Harding in 1918³ and published independently by Titus, Hoffman and Givens in 1920.⁴ The publication of this work resulted in the rapid spread of the treatment by carbohydrate administration and the introduction in these cases of the intravenous method by Titus marked a great improvement in treatment.

It seemed an obvious conclusion to relate the condition of the glycogen depleted liver, the common occurrence of ketosis, and the periodicity of the symptoms with the time in pregnancy when there is a negative nitrogen balance, and when the carbohydrate storehouse, the placenta, is as yet not formed. These facts, if not completely substantiating the theory, at least pointed to starvation as a main factor in the production of some of the graver phenomena of hyperemesis and gave clear indication for the treatment of the condition by glucose. Underhill and Rand⁵ had previously arrived at this conclusion from a study of the nitrogen partition of the urine. Early forms of treatment in our clinic consisted in schemes similar to those elaborated by Harding and Watson⁶ in 1922. These in principle are still followed in the main, but, as our observations increased, it became apparent that by the use of the necessary fluids in glucose administration, we were treating a factor in addition to that of starvation.

It was generally found in a number of patients treated with intravenous glucose that the best control of treatment was the observation of the daily output of urine. Those patients responding to treatment by a large output of urine with a few exceptions markedly and coincidently improved clinically. The urinary output when the patients were first seen was taken as a helpful basis upon which to adjudge the severity of the condition and the necessity of bed treatment. Also the rapidity of the response to treatment; in other words, the time elapsing before a satisfactory diuresis was obtained, was found to bear a relation to prognosis. The patients in whom, after intensive treatment with fluids, the output and quality of the urine did not markedly improve, were the patients in whom abortion was thought necessary to prevent disaster. By diuresis we set an arbitrary standard that the twenty-four hour output of urine should have at least a volume of 1000 c.c. and a specific gravity of not higher than

1.010. Such a diuresis we expected to obtain promptly and where it was delayed longer than a week, we took that fact, along with the other clinical evidence, to justify therapeutic abortion. Thus, in addition to the use of glucose, the use of fluids became of paramount importance. This view was emphasized by Harding⁷ in a communication in which it was pointed out that such results as had been attributed by Haden and Guffy⁸ to the use of sodium chloride, and by Thalhimer⁹ to the administration of insulin with glucose, were in his opinion due to and dependent on the use of fluids.

To investigate further the factor of dehydration, studies were undertaken of the serum proteins. The estimation of the changes in the N.P.N. and uric acid could be accounted for by dehydration but did not appear to have any significant interest. The serum proteins had been used as an index of hydremia in pregnancy¹⁰ and might be expected to bear a relation to this condition in which dehydration played such a large part. From a study of 55 cases,¹¹ it was concluded that the general high level of serum protein indicated concentration brought about by the hyperemesis and reflected at the same time the condition of the tissues. It was noted that the majority of the patients showing a high serum protein value were those in whom intensive treatment yielded the promptest results. These were patients with a short preceding history, in which the dehydration had come on suddenly and acutely. With very occasional exceptions, the high value was found to be a good prognostic sign. On the other hand, when a low value was obtained, the condition had been usually established for some time and, when clinical signs of dehydration were present, the prognosis was serious.

Our interpretation was that,¹¹ "In vomiting of pregnancy the partial or complete abstention of food, coupled with the loss of fluid by vomiting cause an acute anhydremia. The concentration of the serum proteins rises. If at this stage fluids are freely supplied by the use of glucose in saline either intravenously or rectally or by hypodermoclysis, the blood concentration is restored to normal. If isolation and rest in bed are sufficient to check the neurotic element present in these patients, then fluids by mouth are all that is necessary. If, however, the acute dehydration is allowed to go unchecked, destruction of the serum proteins takes place. The value falls to nearer normal, or it may even become subnormal. In these cases, simple replacement of lost fluid will not suffice. There must also be a regeneration of a serum protein before complete recovery is possible. In these cases may perhaps be seen the therapeutic value of larger amounts of glucose in saving N loss to the body and thus aiding protein regeneration. In extreme cases the employment of transfusion would be the logically indicated treatment."

Some five of our patients with a high initial serum protein value, fell to a subnormal level and finally gave normal figures on discharge. This is explained as evidence of the destruction of serum proteins during the course of the dehydration when the anhydremia is overcome; a regeneration of the serum proteins is in these patients necessary and explains the slow recovery of this type of patient. It has also been noted that these latter are subject to relapse.

In treating this factor of dehydration, we found it necessary to use increased amounts of fluid and our earlier view outlined above that failure to produce prompt diuresis was an indication for therapeutic abortion, we were forced to adopt as proof that the quantities of fluid administered were insufficient. In the first years the amounts were from 1000 to 1500 c.c. in twenty-four hours. During the past three years, 3000 c.c. of 10 per cent glucose in normal saline have been given daily in addition to whatever the patient could take by mouth. The rate of administration was governed by the dictum of Wilder and Sansum,¹² in accordance with which the flow was regulated at 600 c.c. of 10 per cent glucose per hour. This would at first sight appear to subject the patient to the hypoglycemic reactions described by Thalhimer,¹³ and be in disagreement with the therapeutic limits established by Titus and his coworkers.¹⁴ The increase in the amount of glucose used in our ward was, however, a gradual one and our avoidance of reaction, of which we have been quite free since the early days when the amounts of glucose were one-third or less, we can attribute to greater care in the preparation of glucose, the use of glucose always in normal saline solution, and more individual regulation of the temperature of the fluid administered. With the necessary details of the preparation all are familiar, but an essential difference between the conditions under which hypoglycemic reactions are reported and our administration is perhaps the use of a normal saline medium. As our patients had no reactions, we made but few blood-sugar estimations but these were invariably within normal limits. The other points of technic stressed here are that the rate was controlled by a side burette after the method described to us by Thalhimer and the use of a thermometer within a glass tube incorporated in the tubing at the vein. The temperature at which the fluid was given could be varied according to the individual, but on an average the thermometer was kept at a reading of from 100° F. to 105° F., permitting the fluid to enter the vein at approximately blood heat or slightly over. With considerable individual variations, it was found that higher temperatures made the patient complain of flushing, headache, and general discomfort and lower temperatures produced feelings of chilliness. That some of our early reactions were due to too low temperatures became evident on noting the temperature at which we now find it necessary to keep the reservoir flask. Care from the nurse is necessary to maintain an even

heat at the vein, and a simple method is the use of hot water bottles along the course of the tubes.

The 3000 c.c. are given in five hours and this technic has been employed without reactions in the last three years as a routine. This amount is given daily and continued until the patient is able to take sufficient water by mouth to maintain a large urinary output. In the great majority of our patients, this treatment, combined with such sedatives as heroin, morphia, and bromides, with attention to the bowel elimination, and isolation, has been effective.

Mouth feeding was begun as soon as possible with light foods, the choice of which we do not regard as of as much consequence as the way in which the trays are made attractive. The length of time the patient is allowed to convalesce under hospital conditions is important, as patients discharged too early tend to have very serious and obstinate relapses.

In the few patients resisting this treatment, where we have sometimes found it necessary to do therapeutic abortion, we believe we have found direct evidence of a third factor, liver degeneration, in addition to that of starvation and dehydration, and that this factor demands an addition to our usual treatment. This view was set forth in 1929 by Harding and his colleagues.¹⁵ In these obstinate cases not recovering on the usual administration of intravenous glucose with the usual large amount of fluids, there is always a persistent urobilinuria and this can be interpreted as evidence of persisting liver damage. In 80 per cent of our cases urobilinuria was present at the beginning. In the great majority of these, the usual treatment is effective in causing the disappearance of this sign of liver derangement, which in these cases is probably slight. In these there is no icterus and only slight increased van den Bergh reactions. These cases respond satisfactorily to treatment, hunger returns, and recovery is progressive.

It is in the few who respond slowly or not at all that, in spite of the correction of the dehydration, urobilinuria persists. With our interpretation of this as a gravely disordered liver function, we attempted to correct it by feeding a much higher number of calories than could be administered intravenously. The method used was the duodenal tube and feedings of 3 oz. of skimmed milk and 3 oz. of 10 per cent glucose were given every two hours throughout the twenty-four. This enables one to give 780 additional calories to the patient as well as 2000 c.c. more water. The results in the few patients in whom this additional treatment is indicated have been so satisfactory as to convince us of the value of the urobilinuria as an urgent sign for higher caloric feeding and of the success of this measure adopted to meet the indication.

A practical point of some importance is that in the absence of adequate laboratory facilities, urobilinuria may be assumed to be present

when the urine has a characteristic orange red color. When the color persists in the urine in spite of adequate treatment, it may be taken as an indication of serious and progressive liver damage.

A fourth factor demanding treatment is the neurotic. The part this plays in an individual case varies considerably but all are aware of its presence to a greater or less degree. It has been seen in a striking form in our special ward of four beds in the aggravation of the condition of the other three when one patient suffers a marked relapse of symptoms. The obvious solution in public ward practice is to be able to isolate each case of hyperemesis. This requires special organization, as these cases cannot be as satisfactorily handled under ordinary ward conditions. A substantial saving of fetal and maternal lives will be made when our public institutions provide facilities for the special nursing and complete isolation of each case of hyperemesis, even for indigent patients.

These, then, are the factors demanding treatment and our experience would lead us in grouping the cases according to these principles:

1. Those patients in whom dehydration has as yet produced few changes and in whom with isolation, rest, and the administration of fluids and food by mouth the cure is easily effected.
2. The group in which dehydration is more acute (usually with a high serum protein value) but in which after repeated daily intravenous injections of 3000 c.c. of 10 per cent glucose given as previously outlined, the clinical recovery parallels the diuresis.
3. The comparatively few patients in whom in spite of such treatment, and the procuring of a satisfactory diuresis, there is little or no clinical improvement. These invariably show a persisting urobilinuria and can be subdivided into (a) patients progressing slowly but amenable to treatment by duodenal tube as already outlined, (b) the very few patients in whom downward progress, in spite of all treatment, can be stopped only by therapeutic abortion.

It is certainly within the scope of this review to deal, if only briefly, with prophylaxis as a logical development from the view that the inherent cause of the mild types of vomiting and the severest forms is the same. We regard these factors outlined above as applicable to the treatment of even the mildest forms of disturbance in early pregnancy, before the patient has as yet failed to compensate the changes threatening from starvation and dehydration. The prophylaxis of hyperemesis is the treatment of all early pregnant patients. When such a patient is not remaining acetone-free, is not maintaining a normal water balance as shown by a low daily output of urine with a high specific gravity, or is rapidly losing weight and strength, she should no longer be treated as an ambulant patient but must be safeguarded by more intensive treatment in bed.

The patient with early symptoms of nausea and vomiting, however, who is showing none of these indications of a losing equilibrium should be put on a routine which takes into account the four factors previously mentioned. It is unnecessary here to list in detail the instructions that such a patient should receive, but some systematic advice should be given her which takes into account that potentially she is threatened with a condition which may be averted by the regular frequent administration of food, of increased fluids, the taking of periodic rest, as well as other obvious matters of common hygiene.

CONCLUSIONS

1. The four factors, starvation, dehydration, hepatic derangement, and neurosis demand treatment by:

- a. Rest in bed with isolation
- b. Sedatives
- c. Intravenous 10 per cent glucose in normal saline in amounts up to 3000 c.c. daily until the urine is increased to at least a liter
- d. The use of larger amounts of carbohydrate and protein by duodenal tube in certain cases

The first two are used to overcome the neurosis, the third the dehydration, and the fourth, the hepatic derangement.

2. The same principles indicate the prophylactic measures which should be used in the treatment of early mild nausea and vomiting.

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VENOCLYSIS, THE CONTINUOUS INTRAVENOUS ADMINISTRATION OF GLUCOSE

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THIS discussion is in the nature of a supplementary report of further work described in an article by the author, published in Vol. XLII, 1929, of the Transactions of this Society, entitled "Glucose in the Treatment of Pregnancy."

In the consideration of any therapeutic agent, the principal factors to be determined are: (1) Indications for the use of that particular substance in a given disturbance; (2) Dosage; (3) Methods of administration. The presentation of this paper concerns chiefly the last named factor, namely, a practical method of supplying glucose in solution to a patient in quantities sufficient to maintain adequate nourishment, supply sufficient fluids for body needs and deriving certain therapeutic benefits therefrom.

The value of glucose and indications for its use as a therapeutic agent, especially in the toxemias of pregnancy, has been so ably shown by various investigators, that we will not discuss it here. The dosage has been determined by Titus,¹ Woodyatt, Sansum² and others, and from our experience, has been reduced to a practical working basis.

The various methods of administration of glucose are: by mouth, rectally, subcutaneously, intraperitoneally and intravenously. When given directly into the circulation it may be administered by the dosage method (given quantities administered at varying intervals, as employed by Titus and others, or by a continuous flow over a prolonged period of time, as employed by Matas, Hendon, Warthen and others. Matas³ was first to use this method, and called it the "continuous intravenous drip." Hendon,⁴ closely following Matas in his investigations along this line, called the method "venoclysis," and to him belongs the credit of first devising and reporting a technic and apparatus making the system capable of practical use. We have employed his technic in our work.

The essential features of the apparatus used are two thermos bottles of 1000 c.c. capacity each, suspended in a wire frame and attached to a Y-tube, which is in turn connected to a Murphy drip tube; from this a single rubber tube leads to a gold-plated silver cannula. This cannula is inserted through a phlebotomy opening into a vein just above the bend in the elbow. The vein is ligated distal to the insertion, and a ligature of umbilical tape is passed around the cannula in the vein, held in situ by a shoulder on the cannula. The wound is closed and a sterile dressing applied. The rubber tubing is fixed to the arm by strips of

adhesive, permitting the patient to move the arm at will during the administration. The use of two thermos bottles permits the employment of one while the other is being filled. The thermos feature keeps the solution at a constant temperature.

The hole in the Murphy drip tube is covered with adhesive, aiding materially in the regularity of the flow from the reservoir. Other veins may be used, but we have found that if the insertion is made sufficiently far above the elbow to be proximal to the tributary radicals of the vein employed, there is no back-flow of blood into the cannula and the flow may be temporarily discontinued and resumed without clot formation.

The greatest disadvantage to this method is the necessity for cutting down on the vessel, with a resultant scar. We can keep the flow going satisfactorily for eight to twelve hours by piercing the vein with a large needle, but after a time the lumen becomes occluded, and another puncture must be made. If longer continued use is desired, a phlebotomy must be done and a cannula employed.

After a few days in some cases the arm above the insertion becomes congested and reddened, causing the patient some discomfort. This can be largely relieved by an ice-bag applied to the congested area.

Then the performance of a phlebotomy is a more complicated procedure than the mere piercing of a vessel with a needle.

The chief advantage in the use of the cannula is that with one insertion into the vein a continuous flow can be given over quite a number of days without further disturbing the patient. The principle advantage of a prolonged continuous flow over the "dosage" method is that not only can much larger quantities of nourishment and fluids be given a patient in each twenty-four-hour period, but because the flow is continuous there is no danger of any sudden overload upon the circulation or assimilative process of the body.

In most of our cases the apparatus is set to deliver forty drops of 10 per cent glucose per minute. This gives the patient 400 grams (0.8 pounds) of sugar and 4000 c.c. (one gallon) of fluid per day. In order to accomplish this with intermittent injections, four injections of 1000 c.c. each at six-hour intervals, or eight injections of 500 c.c. each at three-hour periods, would be required.

Other substances can be administered by this same method. Saline solution or Ringer's solution can be used alone or in combination. Such drugs as sodium luminal, sodium amytol and digifolin, adrenalin or caffeine can be injected into the solution through the small hole in the Murphy drip tube. Citrated blood may be given with the glucose.

Dr. H. J. Warthen⁵ reports in July, 1930, issue of the *International Surgical Digest*, extensive work done with this method in the Surgical Department of Johns Hopkins. His technic is very similar to that of Hendon, and his observations correspond very closely to ours. He cites

one of his cases in whom "the solution was given continuously for eighteen days, with the exception of three short intervals during the removal and reinsertion of the cannula into a different vein." Fifty-four thousand c.c. of 5 per cent dextrose were given during this time. He uses veins about the ankle as well as in the arm.

The chief use for venoclysis is in cases where the giving of food, water or drugs by mouth is impracticable. In obstetrics, hyperemesis gravidarum with dehydration offers the most outstanding indication for this method of treatment. Hendon's cases and those of the author, treated for hyperemesis by this method, are 15 in number. Most of these patients had received glucose intravenously by the intermittent method, without apparent benefit. In each case the hyperemesis was of the severe type of considerable duration. All showed marked improvement, and most of them were completely relieved by the end of the fifth day. None of them died of hyperemesis. One died later in pregnancy of a perforated gastric ulcer and one had a therapeutic abortion done after she left our care, but her general condition had been so improved as to make the operation practicable.

Two of the above patients have again become pregnant and have passed the third month without any vomiting. Whether this is coincidence, or due to the regenerating influence of the glucose, we cannot say. In both cases, however, they have each had several pregnancies, and in all others the vomiting had been severe. We have found in treating hyperemesis by this system that nausea and vomiting are more quickly relieved by adding sodium luminol or sodium amyta to the glucose.

In the primary toxemia of early pregnancy, that is, a severe vomiting due directly to the pregnancy, glucose has proven in our hands a most valuable remedy, acting practically as a specific. In the secondary toxemias, where the vomiting is due to some preexisting pathology such as nephritis, gastric ulcer, gall bladder infections, etc., glucose treatment aids materially in supporting the patient, but seems to have very little effect in controlling the vomiting.

It is well understood that dextrose does not become available for use in the body until it has undergone certain biochemical changes. It is stored in the liver as glycogen. One of the chief agents said to produce these changes is a substance developed by the activity of voluntary muscles. When the patient is at rest, the conversion of the vegetable dextrose into animal glycogen proceeds much more slowly. The dextrose remains, for a longer period of time, therefore, as a foreign substance. In the intravenous administration of glucose this factor should be borne in mind.

In our investigations we have attempted to ascertain the relative effect on blood sugar of the slow, continuous administration in comparison with the more rapid, intermittent method. We took two series of cases

for this study, taking blood-sugar readings at half-hour intervals, the first reading being taken just before the administration was begun, securing a specimen each half-hour until six readings were obtained. In one series the glucose was given by the continuous method, and in the other series 500 c.c. of 20 per cent solution was administered over a period of about forty-five minutes. Table I shows all the readings obtained in these two series. While the number of cases investigated is not large, yet a very striking uniformity of results will be noted; so much so indeed, that we felt it would not be amiss, for the purpose of graphic charting, to total each column of a given half-hour period for the entire series and graph the averages. It will be seen that the initial blood-sugar rise in the venoclysis cases averaged 69 mg. per 100 c.c., while in the cases given glucose by the dosage method, the average initial rise was 438 mg.

TABLE I

NAME	MG. BLOOD SUGAR BEFORE INJECTION BEGAN	ONE-HALF HOUR LATER	ONE HOUR LATER	ONE AND ONE-HALF HOURS LATER	TWO HOURS LATER	TWO AND ONE-HALF HOURS LATER
VARIATIONS IN BLOOD SUGAR DURING CONTINUOUS GLUCOSE ADMINISTRATION						
L. P.	135	204	196	169	181	200
N. G.	111	135	133	130	111	117
N. N.	102	160	153	128	115	114
R. T.	142	273	364	250	235	454
S. T.	133	166	125	158	101	97
B. W.	123	243	151	126	111	117
Averages	124	193	190	160	142	183
VARIATIONS IN BLOOD SUGAR DURING INTERMITTENT GLUCOSE ADMINISTRATION						
E. G.	97	400	222	181	133	116
M. S.	160	800	614	362	285	234
L. R.	117	666	250	142	111	111
C. M.	142	666	500	370	344	224
A. C.	98	266	142	98	95	95
Averages	122	560	345	230	193	156

Table II shows the graphic plotting of the average variations of blood sugar during the first three hours of administration by the two methods.

It is reasonable to suppose that a similar variation occurs in the volume of the blood-vascular system. From a mechanical standpoint, therefore, as well as from a biochemical, it would be apparent that there is much less danger of overloading the cardiovascular mechanism as well as the assimilative processes of the body when glucose is given by the slow, continuous method.

Insulin was not used in any of these cases, and it will be noted that in none of them was there any tendency to hyperinsulinism.

In subsequent blood-sugar readings taken at varying intervals the sugar level remained very near that of the last reading in this table.

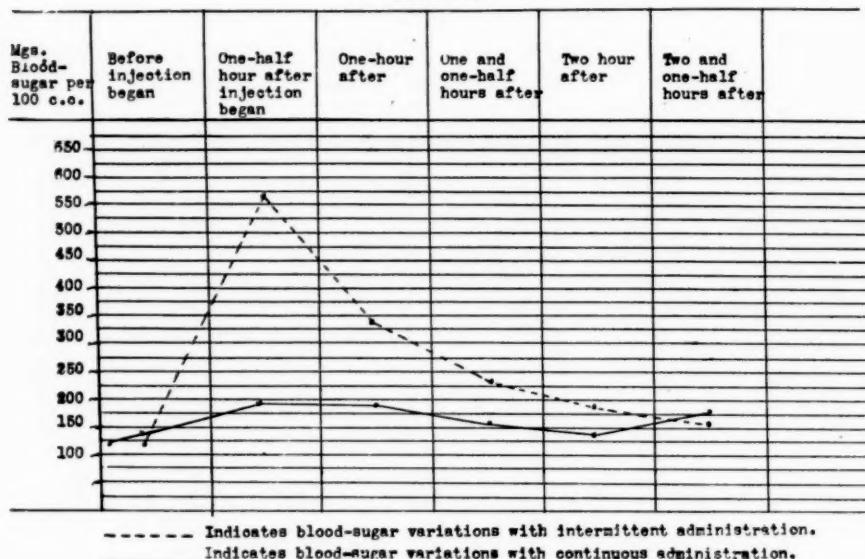
Glycosuria is rarely encountered in any of our cases, and when it appears can be overcome by reducing the concentration of the solution administered.

Warthen⁵ gives 5 per cent glucose in normal saline. He says, "With patients showing evidence of nephritis, normal salt solution is administered with caution and is discontinued as soon as possible for fear that salt retention may follow, with edema and possible pulmonary complications."

From a clinical standpoint, we have had fewer reactions with venoclysis than with the intermittent method.

Hendon has used his venoclysis method in several hundred cases, and his results have demonstrated that the procedure has a distinct

TABLE II



clinical value. His observations cover a period of about five years. The author is indebted to Dr. Hendon for the privilege of observing a large number of these cases, and it was the striking clinical results obtained that prompted us to undertake an investigation of the biochemical phenomena encountered when this system was used, and to ascertain its clinical value in obstetric practice. We wish to acknowledge our gratitude to the Research Laboratory of the Louisville City Hospital, under the direction of Dr. John Walker Moore, and to the resident staff of the Obstetrical Department of this institution for their valuable aid in making these investigations.

We might further add that the work of Hendon has brought out some very interesting clinical facts.⁶ It has been found, for instance, that a far greater amount of glucose could be given, and for a much longer period of time than was formerly supposed. Hendon has maintained

adequate nourishment and a sufficient supply of fluid for as long as fifteen days without anything by mouth or rectum. Dr. Frank Strickler reports a case maintained thus for twenty-one days.

In none of the cases so treated has there been any noticeable ill effects due to a lack of protein supply. The glucose has apparently been adequate to maintain a well-balanced metabolism. The individuals so treated have all been very sick, and the almost universal rule has been an increase in strength and energy.

None of Hendon's patients have showed any tendency to hyperinsulin disturbances. Much apprehension has been felt in the past lest the administration of large quantities of sugar overstimulate the production of insulin with resultant shock. But it is certainly apparent that with the slow continuous method, at least, such fears are groundless.

No case among the hundreds so treated has showed any signs of thrombus or embolus disturbance. Any given vein so used will become occluded in from five to seven days, but the ligature distal to the insertion seems to prevent clot particles from getting into the circulation.

We have found that in the average case 200 c.c. per hour is the maximum rate of administration. If given faster, evidences of overloading are often noted.

This discussion has primarily to do with the use of the continuous administration of glucose in hyperemesis gravidarum, but this procedure has been used with marked success in other disturbances incident to or complicating pregnancy, such as puerperal sepsis, anemia from hemorrhage, peptic ulcer, peritonitis, biliary tract disease, and other conditions where feeding by mouth is inadequate or impracticable.

While we do not contend that every case of hyperemesis should be treated by the continuous drip method, yet from our observations we do feel that many cases can be successfully treated thereby where less radical measures fail. If future experience with this method continues to show the same degree of effectiveness in the treatment of severe hyperemesis as we have already found, it will take its place as one of the most valuable weapons available in combating this dread disease.

SUMMARY

1. "Venoclysis" is a term employed by Hendon to denote the administration of fluids into the blood stream through a cannula anchored in a vein, the solution flowing continuously and slowly over a protracted period of time.

2. A technic has been devised whereby a continuous flow may be used, rendering the procedure safe, practicable and adequate for supplying nourishment, fluids and therapeutic agents.

3. By this method, glucose may be given, conserving the metabolic or blood-volume balance, maintaining the normal ratio between delivery and distribution.

4. Biochemic findings show this to be the ideal method of giving glucose where considerable quantities are to be given over a long period.

5. Clinically, this method of administration has proved of marked value in the severe type of hyperemesis gravidarum with dehydration, as well as other obstetric complications where feeding by mouth or rectum is for any reason inadequate or impracticable.

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CHORIOMAS

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EIGHT cases of malignant choriomas and three cases of benign choriomas were observed in our clinic within a relatively short time. They were referred either on account of persistent uterine bleeding simulating a malignant disease in some instances or for prophylactic radiation therapy to prevent recurrence after preceding surgical removal. The pathologic, diagnostic, and therapeutic observations were of unusual interest and are herewith recorded.

Choriomas are of infrequent occurrence. Szathmary collected from 53,000 consecutive pregnancies 39 cases of hydatid mole, i.e., one mole in 1690 pregnant uteri, and 11 cases of malignant chorionepithelioma, or one malignant chorioma in 4900 pregnant uteri. Five cases of chorionepithelioma followed a preceding mole, 15.1 per cent of the 32 moles.

Tumors of the chorion develop from the chorionic epithelium which is derived from the trophoblast. As soon as the epithelial cells acquire the faculty to destroy maternal tissue then the ovum or blastocyst attains enlisting or invading powers and at this time imbeds itself wherever it happens to be. The entire process of implantation and the subsequent formation of the placenta is termed placentation.

The study of chorionic tumors requires an intimate knowledge of the processes of nidation and placentation. Several stages in these processes verge closely on pathologic malignant states but, of course, are entirely of a physiologic nature. By a process of histolysis the ovum or blastocyst excavates an opening in the lining of the most adjacent maternal tissue and sinks beneath the tissue surface, usually the decidua vera of the uterine body. The lytic power is ascribed to the Langhans cells and the resorptive power is attributed to the syncytial or plasmoidal cells

of the chorionic villi according to Grosser. The port of entry in the decidua becomes closed over the ovum by the formation of a plug composed of chorionic cells, decidual cells and fibrinous material. Thus the nidation of the ovum in the blastocyst stage is completed and the process of attachment to the maternal tissue begins.

The degree of union of ovum and maternal tissue may be epitheliocchorionic, syndesmochorionic, endotheliocchorionic, or hemochorionic. The latter form requires the most extensive destruction and invasion of the maternal tissue by the chorionic cells and is the type occurring in the human subject. The lytic and invasive activities of the chorionic cells end when a direct contact between the maternal blood and the blastocyst has been established.

Chorionic giant cells permeate the uterine wall throughout pregnancy and if placental tissue has been left behind at labor, also during the puerperium until every vestige of the ovum has been expelled or removed. This finding according to R. Meyer is analogous to other benign heterotopies without destructive or solvent capacities such as adenomyosis or endometriosis. The occurrence is especially pronounced in uteri weakened by other pathologic processes.

The histologic structure of the chorionic villus and the tumors of the chorion will not be described as a knowledge of these conditions is presumed. Proliferation of the chorionic epithelium, destruction and invasion of the maternal tissues are the physiologic processes of the trophoblast akin to the pathologic but similar processes seen in choriomas.

Tumors of the chorion may be benign or malignant. The benign growths are the simple hydatid mole and the invasive hydatid mole. The latter has been termed chorionadenoma destruens by Ewing. The malignant tumors comprise the typical malignant chorionepithelioma and the atypical chorionepithelioma malignum.

The simple and invasive hydatid moles possess the relative inability of the chorionic epithelium to rid itself from the connective tissue core of the villus. The persistence of the mesodermic tissue in the chorionic proliferation constitutes a reliable index of benignancy. Durante and Ewing consider the villi to be glands in every essential aspect, both anatomic and physiologic. A tumor which reproduces in an orderly manner the structure of a glandular organ is by common definition an adenoma. The mole may invade the placenta either partially or totally. Total degeneration of the placenta causes death of the embryo. The mole is an epithelial proliferation. The hydropic swelling of the chorionic cells causes the formation of vesicles. The edematous permeation of the stroma is generally considered a regressive process.

The invasive mole is of the same structure as the simple mole but characterized by a deep penetration of the villi into the lumen of the uterine vessels. The epithelium rarely breaks through the vessel wall.

Similar observations may be noted in ectopic implantations of the ovum and in placenta accreta. It is not improbable that the deeply intra-vascular position of the villi may favor a malignant degeneration, as prolonged viability of the chorionic epithelial cells is assured by the constant supply of fresh blood. However, intravenous invasion per se is not an evidence of malignancy. The villi lie entirely in the vessel lumen.

Marchand has divided the malignant choriomas into typical malignant chorionepithelioma and atypical chorionepithelioma. The malignant proliferation of the chorionic epithelium is a continuation or reactivation of the trophoblast at the stage of implantation. The typical malignant chorionepithelioma, the choriocarcinoma of Ewing, is composed of compact masses of Langhans cells, syncytium and intramural chorionic cells. The plasmoidal cells are seen in the peripheral zone of the cell mass, while the intramural cells form the vanguard. The villous stroma does not participate in the tumor growth. It is missing. According to R. Meyer the ratio of Langhans cells to syncytial cells to intramural cells in typical chorionepitheliomas should be the same as found in the villi and uterine wall during the implantation period of the first and second months. Should the typical ratio be changed in favor of either the Langhans, the syncytial or the intramural cells, then the chorionepithelioma is atypical.

Ewing described cases formed almost entirely of syncytial cells and termed them syncytoma malignum. They number at the most about 5 per cent of the total number of malignant choriomas. He states that they are relatively benign. The presence of Langhans cells in predominant numbers constitutes the most malignant type of choriomas.

At times a large increase in the number of intramural cells in the absence of any intrauterine growth has been found. The cells are of the syncytial or giant cell type. The hyperplasia has been called by Ewing syncytial endometritis. R. Meyer and others have described similar findings. The significance of the syncytial hyperplasia is that simple curettage will bring about a complete healing. Should bleeding recur then radium may be inserted intrauterine. This has been successfully done by Rosenzweig.

The conclusion may be drawn that, whenever malignant qualifications develop in the chorionic epithelium, as anaplasia, atypia, invasive and destructive tendencies and capacity for metastasation, then the benign chorionadenoma ends, and with the disappearance of the central connective tissue core the chorionepithelioma begins. Hence the persistence of the mesodermic tissue in the chorionic invasion constitutes a reliable index of relative benignity. Choriomas composed of only one type of chorionic epithelium do not exist.

It is evident that histologic examinations should be done on all tissues expelled or obtained by the curette after abortions, labors, and expul-

sion of a supposed mole. One should also remember that negative histologic findings do not exclude the presence of choriomas as they may grow intramurally.

When performing a diagnostic curettage it would be desirable to excavate a piece of tissue from the uterine wall to enable one to study the fetal and maternal relation. Vaginal hysterotomy should be done, if curettage is negative and the possibility of the existence of choriomas is present indicated by the history and symptoms in the case.

Spontaneous regression of the primary growth even after the formation of metastases, and regression of metastases after removal of the primary growth have been reported by many writers. Ewing states that regression is seen only in benign choriomas, malignant syneytioma and syneytial endometritis and never in a choriocarcinoma containing a predominance of Langhans cells. If death occurs in cases with benign growths it results either from severe and continued loss of blood or secondary infection.

No discussion of the symptoms and signs and differential diagnosis is needed here. If the rule is followed that the underlying disease in uterine hemorrhages must be immediately diagnosed, and that diagnostic curettage must be made if clinical measures fail, then failures in diagnosis will be few.

Newer procedures in diagnosis are the roentgen rays and the biologic pregnancy reaction of Zondek and Aschheim.

If pregnancy is suspected in a bleeding uterus the size of a four to five months' pregnancy an x-ray picture should be taken. If irregularities in the uterine wall or abnormal shadows are found with or without a fetus, the assumption is justified that a chorioma probably exists. In a recent case of a suspected uterine tumor, the x-ray revealed a fetus and an irregularity in the right uterine horn. The fetus and intact normal secundines were expelled spontaneously within twelve hours. Involution did not occur. Examination on the tenth day post-partum revealed an open cervical canal, the examining finger felt a soft mass in the uterine cavity, biopsy and frozen section examination revealed a typical malignant chorionepithelioma. A hysterectomy was done immediately.

Ponzian recommended hysteroscopy after the intrauterine injection of iodized oil to diagnose choriomas. The danger of forcing chorionic tissue through the uterine tube or a weakened uterine wall contraindicates the procedure.

Aschheim states that the urine of patients with hydatid mole or chorionepithelioma gives a pregnancy reaction in mice about ten times stronger than that obtained from women in the eighth pregnancy week. Reports published by Fels and others in the literature confirm these findings. A valuable test is thereby given enabling one to confirm a

suspected diagnosis of chorioma or a recurrence after a surgically removed mole or chorionepithelioma.

The treatment of benign choriomas if bleeding continues after the expulsion of the mole is speedy removal of the uterine contents with the curette and microscopic examination of all tissues removed.

The treatment of the malignant choriomas is a radical panhystereotomy if a histologic diagnosis has been made. Even if metastases have formed hysterectomy should be done as regression of metastases after operation has been repeatedly observed in choriomas.

In late years quite a number of cases have been reported in the literature which were successfully subjected to radiation. The epithelial cells of choriomas are of a highly embryonic and anaplastic character and should be very radiosensitive. Therefore radiation therapy should be used in cases offering a poor surgical risk or after operation to prevent recurrences.

In 1918 a patient in the 16th week of pregnancy entered St. Mary's Hospital on account of severe hemorrhages from the right kidney. A diagnosis of a malignant tumor of unknown type was made. On account of the anemic condition of the patient and the pregnancy, the kidney was treated with filtered x-rays and the hemorrhages ceased. About a month later the uterine contents were spontaneously expelled. Microscopic and macroscopic examination revealed a typical malignant chorionepithelioma. Radium was inserted intrauterine and heavy filtered x-rays were applied through suprapubic and sacral fields. The patient is well at the present writing.

A second case of malignant chorionepithelioma was admitted for radiation therapy about two and one-half years ago. The contraindications to operation were pronounced anemia and extensive invasion of vagina and left parametrium. Radium and x-ray treatments caused an anatomic healing. The patient was well two and one-half years after treatment.

Similar observations have been reported by Naujoks, Gordon, Szathmary, Loebe, Klein, and others,

From the records appended it is seen: (1) that two cases of malignant choriomas treated with radium and x-rays alone are well thirteen and two and one-half years respectively; (2) that three cases were treated with hysterectomy followed by radium and x-rays; one case is well two and one-fourth years, one case one and three-fourths years and one case three-fourths year; (3) that two cases were subjected to hysterectomy alone; one patient died from an infection, the other patient is well nine months; and (4) that one chorionepithelioma recurring after operation with metastases in pelvis and brain was unsuccessfully treated with x-rays.

It is an axiom: if a malignant chorioma does not recur within six months, the patient probably will remain well, and if it does not recur within one year after cessation of treatment the patient may be considered cured.

SUMMARY

1. Tumors of the chorion may be benign or malignant. The benign growths comprise the simple hydatid mole or chorioma simplex and the invasive hydatid mole or chorioma accreta. The malignant group includes the typical malignant chorionepithelioma and the atypical malignant chorionepithelioma.

2. The persistence of the chorionic connective tissue of the villi in the chorionic epithelial cell proliferation is characteristic of the benign choriomas. Absence of the connective tissue with anaplasia and atypia of the chorionic epithelium, and invasion, destruction and formation of metastases in the maternal tissues constitutes a malignant chorioma.

3. Roentgen-ray examinations and the Aschheim-Zondek pregnancy reaction may render valuable aid in the diagnosis of obscure cases of choriomas or suspected recurrences.

4. Benign choriomas may become detached from the maternal tissue and borne by the uterus. If retention and reactivation of remnants occur as indicated by recurrent uterine bleeding and corroborated by the Aschheim-Zondek test then curettage should be done.

5. Malignant choriomas must be subjected to radical panhysterectomy as soon as the clinical diagnosis has been corroborated by a histologic examination. The favorable results obtained with radiation therapy without the use of surgical measures in two choriocarcinomas permit the conclusion that hysterectomy followed by radiation therapy may lessen the number of recurrences in the malignant choriomas. Apparently the good end-results obtained in this series of cases with a combined treatment of surgery and radiation prove the soundness of this deduction.

6. Bleeding from a uterus, particularly a pregnant uterus, is always a serious accident. All tissues expelled from such a uterus should be subjected to competent microscopic examination which is essential in arriving at a correct diagnosis and applying the indicated treatment.

CASE REPORTS

CASE 1.—Mrs. McK., aged thirty-two, gravida 6 and para 5, was admitted to St. Mary's Hospital September 21, 1918. She had had hemorrhages from the right kidney for three months previously. A diagnosis of malignant tumor of the right kidney was made from the pyelogram. Due to the pregnancy it was treated with deep x-ray therapy, which arrested the bleeding.

On September 23, 1918, a fetus with membranes intact was expelled spontaneously. Microscopic examination revealed a typical malignant chorionepithelioma. The kidney tumor was then considered a metastasis. Radiation therapy was advised and 2040 mg. element hours of radium filtered with 2.0 mm. brass were given intra-uterine and a 150 per cent erythema dose of x-rays was applied to the center of the pelvis through suprapubic and sacral fields. The patient has remained well.

CASE 2.—Mrs. E. S., aged thirty-two, gravida 1, para i, was seen in consultation April 28, 1926. She had an amenorrhea from November, 1925 until February 14, 1926, when uterine hemorrhages occurred. These stopped while the patient was kept in bed at absolute rest but immediately reappeared upon arising. On April 7 a mole was expelled. A microscopic examination was not made.

The hemorrhages continued and within two weeks bimanual examination revealed large masses of unknown nature in both parametria. On April 28 a panhysterectomy was done. The ovaries were the size of large oranges. Microscopic examination revealed a typical chorionepithelioma. The patient died from sepsis and peritonitis May 16, 1926.

CASE 3.—Mrs. B. O., aged twenty, gravida 1, para 0, was referred from the Cook County Hospital to Mercy Hospital for radiation therapy of a typical chorionepithelioma malignum with extensive metastases in the vagina. She gave a history of amenorrhea of two months' duration since August 6, 1927, followed by severe metrorrhagia, which was still existent on admission. She had marked vomiting of pregnancy. A mole was expelled on January 15, 1928, which was followed by pyrexia. On January 22 extensive invasive and ulcerative growths were found in left vaginal wall and parametrium. Microscopic examination of tissues revealed a typical malignant chorionepithelioma.

The treatment consisted in the intrauterine insertion of 2400 mg. element hours of radium filtered with 2.0 mm. brass and the application of 800 "r" x-rays each to a suprapubic and a sacral field from Jan. 31 to Feb. 14. The patient recovered anatomically and has remained well to the present writing.

CASE 4.—Mrs. S. M., aged twenty-two, gravida 2, para ii, was admitted from the Cook County Hospital for radiation treatment of brain metastases due to a recurrent chorionepithelioma on Feb. 10, 1928. The patient had had uterine hemorrhages for six months prior to a panhysterectomy performed for the hemorrhages in September, 1927. Seven weeks later intense headaches developed accompanied by a left-sided paralysis and in December, 1927 a tumor was discovered in the pelvis. A biopsy was then performed which revealed a typical malignant chorionepithelioma. X-ray doses of 800 "r" each were applied to brain and pelvic tumor. However the patient succumbed within three months.

CASE 5.—Mrs. A. C., aged thirty-nine, was admitted to the service of Dr. O'Donohue Sept. 9, 1928, stating that she had had an abortion in March, 1926 which was followed by a continuous bleeding from the uterus. A curettage followed by the insertion of radium intrauterine was made in September, 1927. A microscopic examination was not made. In May, 1928 persistent uterine hemorrhages, malodorous discharge, and pelvic pain appeared. A panhysterectomy was performed Sept. 12, 1928. The histologic examination revealed a typical malignant chorionepithelioma. Short wave x-rays were applied to the pelvis from Oct. 2 to 15 giving 800 "r" to the midpelvic region. The patient has remained well.

CASE 6.—Mrs. F. G., aged eighteen, gravida 1, para 0, was admitted May 13, 1929. She had had an amenorrhea for three months and uterine bleeding for the last four days. Examination revealed an open cervix, an enlarged uterus, the size of an eight weeks' pregnancy and a protrusion from the cervix of dark bluish grape-like masses. Biopsy revealed a malignant chorionepithelioma. A panhysterectomy was done May 14, 1929, and a dose of 800 "r" of short wave x-rays was applied to the midpelvis from June 1 to 29. The patient has remained well.

CASE 7.—Mrs. C. A., aged twenty-one, gravida 1, para 0, was admitted to the service of Dr. Vaughn Sept. 16, 1929. She had had an amenorrhea for five months and on Sept. 12 a mass was expelled spontaneously from the uterus which was followed by a continuous bleeding. A curettage was done on Sept. 16 but the bleeding continued.

The patient reentered the hospital October 7. A biopsy revealed a typical chorionepithelioma and a panhysterectomy was immediately performed. The patient is well at the present writing.

CASE 8.—Mrs. M. L., aged thirty-three, gravida 1, para 0, was admitted November 7, 1929. She gave a history of a hypermenorrhea for four months, followed by profuse and continuous metrorrhagia for the last two months. An x-ray picture revealed a fetus in transverse position in the lower uterine segment and an unusually large area of the supposedly amniotic sac. A spontaneous abortion occurred within twelve hours; a fetus of apparently three months' size and a normal placenta being expelled.

The uterus did not undergo involution. An examination on November 18 elicited an open cervical canal and a soft mass in the right posterior uterine wall. An immediate diagnostic curettage was made. The frozen section examination revealed a typical chorionepithelioma malignum. A panhysterectomy was immediately performed. Short wave x-rays were applied to the pelvis, the dose being 800 "r" in the midpelvis. The patient has remained well so far.

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OBSTETRICAL MORBIDITY AND END-RESULTS

A PLEA FOR NEW MORBIDITY STANDARDS

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WITHIN recent years the medical profession has been concerned with checking up the end-results of its work. Scientific inventory-taking makes it possible to anticipate what will occur following a line of action if certain fundamental facts are given. The conclusions drawn from such studies by men of sound judgment and experience have been invaluable. Concerning obstetric morbidity this does not hold true. Our present morbidity records are not reliable.

Our attention was attracted to this subject from reading so many conflicting reports. The majority of published articles on this subject, in the last analysis, have proved nothing of a concrete, definite character. The subject has been considered from a multitude of angles. Studies have been based on as few as 89 cases and as many as several

thousand. Even the subdivisions, such as rectal versus vaginal examinations and morbidity, have resulted in a wide variance of opinion. It leaves one confused and incredulous.

All do not agree on the definition of morbidity. The fault lies in the fact that any summary of morbidity is apt to be valueless because there are so many standards in use. All are based on the index of temperature. On the one hand, one may choose the standard offered by the American College of Surgeons, the University of Michigan, the American Medical or British Medical Associations, etc. On the other, one may choose from standards set by individuals. DeLee, Goodall and Wiseman are examples of but a few of these. The majority accept the standard of an elevation of temperature of 100.4° F. on two successive or more days, not including the first twenty-four hours after delivery and not after ten days postpartum. And so, it resolves itself down to the fact that different workers have their choice of different standards for morbidity but all are based on a certain temperature for a certain period of time within fixed time limits. Etiologic factors, underlying pathology, future possibilities, or anatomical damage as a result of childbirth assume minor rôles. This leads to reports of morbidity findings as low as 3.4 per cent and as high as over 70 per cent. Surely such a wide variation shows on its face that something is amiss which calls for further consideration.

Therefore, believing that present methods of computing morbidity are wrong, we decided to review some of our own records to see if we were right in our premises.

J. O. Polak published the morbidity findings for five years (1924 to 1928 inclusive) totalling 5460 cases at The Long Island College Hospital. The average morbidity for the in-patient service was 10.52 per cent; for the out-patient service 3.10 per cent, an average of 6.86 per cent. Polak said, "If we accept as febrile a morbidity based on a single rise in temperature on any day during the puerperium, we find that for all the years it is 73.96 per cent." Some years ago one of the writers (Welton) reported the mortality and morbidity figures for four years on the obstetric services at the Greenpoint Hospital, the cases totalling 3107. This was for the purpose of showing the results of conservative obstetrics. In addition we reviewed 1092 cases during 1929 at The Long Island College Hospital. We have grouped these findings and offer a composite review. We do not present these results for the purpose of impressing one with our morbidity findings, but to prove that if allowed to stand alone, as is the case with the majority of reports, they will be misleading.

Our gross morbidity was 7.80 per cent. This was based on the temperature standard offered by the American College of Surgeons. What does this morbidity mean? It means that seven and a fraction women out of every hundred, twenty-four hours following delivery, had a certain temperature for a certain length of time. A careful review of

the case histories revealed that these figures did not include all cases that were actually morbid, that many cases tabulated under morbidity were not such in a true obstetric sense, and that many patients who had pathologic findings but who ran an afebrile course were not, therefore, classed in the morbidity column. Some patients never ran a temperature above 100° F. until after the tenth or twelfth day. They were classed as negative although after that time positive complications arose.

Cognizant of these facts we believe our report of a morbidity of 7.80 per cent is valueless, except in so far as we learned that a certain percentage of women in childbed had at some time a certain temperature.

It has been said that obstetric morbidity varies with the seasons. Therefore we worked out our morbidity by months.

We found the morbidity by months to have been:

September	7.50 per cent
October	8.20 per cent
November	8.60 per cent
December	7.50 per cent
January	8.10 per cent
February	10.20 per cent
March	8.80 per cent
April	8.0 per cent
May	8.1 per cent
June	6.8 per cent
July	6.6 per cent
August	5.3 per cent

From this one might conclude that the morbidity rate rose slightly during the winter months. However, it is well known that in certain areas the incidence of upper respiratory infections from November to April plays havoc with the morbidity rates. Upper respiratory infections were accountable for the following proportion of the listed morbidity:

September	1.3 per cent of total morbidity
October	3.8 per cent of total morbidity
November	26.1 per cent of total morbidity
December	34.2 per cent of total morbidity
January	40.0 per cent of total morbidity
February	38.3 per cent of total morbidity
March	26.4 per cent of total morbidity
April	9.0 per cent of total morbidity
May	4.1 per cent of total morbidity
June	0.8 per cent of total morbidity
July	1.1 per cent of total morbidity
August	0.4 per cent of total morbidity

If this be true then our supposed corrected morbidity is lower during the winter months. However, this, too, is a trick with figures based on temperature.

Many conditions having no or only a remote relation to the pregnant state were found to account for fever in addition to upper respiratory infections. We list: toxic urticaria, appendicitis, septic endocarditis, pyelitis, massive collapse of the lung, cystitis, Vincent's angina, pulmonary embolus, infected teeth, abscess of Bartholin's

gland, pneumonia, pleurisy, infected hemorrhoids, gall bladder affections. In a large number of cases no cause for the temperature could be discovered. These conditions (and others no doubt not diagnosed) caused an increase in the obstetric morbidity figures.

Deducting all causes not related to obstetric pathology we found the true causes for fever to have been: lochiometra, endometritis, mastitis, breast abscess, parametritis, peritonitis, thrombophlebitis of the pelvic veins, phlegmasia alba dolens, bacteremia, rupture of an ovarian abscess, infection of the perineum and cervix, and the postoperative rise following cesarean section.

Exclusive of all causes for fever having no bearing on the parturient state or related to pregnancy, the corrected morbidity would be:

September	4.3 per cent
October	5.1 per cent
November	4.3 per cent
December	3.9 per cent
January	3.8 per cent
February	4.1 per cent
March	5.1 per cent
April	3.7 per cent
May	4.2 per cent
June	4.4 per cent
July	5.0 per cent
August	5.1 per cent

This gives a corrected morbidity of 4.5 per cent. On dismissal from the hospital only 0.6 per cent could be placed in the morbidity class.

We looked deeper into this corrected morbidity rate in an attempt to ascertain if this supposed true morbidity percentage had any practical value. We concluded it meant nothing. For, in studying these individual records it was surprising to note how many patients ran temperatures, often above 103° F. for a short time (one to three days), in which no positive findings were present. Suddenly the temperatures permanently dropped to normal. Repeated examinations and laboratory check-up gave negative reports. We will never know what occurred. No physical damage was done. It was merely curious that these women ran a high temperature for a short time. Yet, such cases are classed as morbid. It only proves that some transient, mild obstetric complication was present that quickly cleared up, leaving the patient in a normal condition. No matter how we tabulate or juggle such figures we will not learn how to prevent such flare-ups in the future.

On the other hand, we noted that many patients ran a low degree of temperature (99° to 100.2° F.), for days, with well-defined evidence of trouble present. We did not include such cases in the morbidity tables as they did not come under our standard for morbidity. For all practical, common sense purposes they should have been included. Also we observed it is common for a febrile state to exist for several days following a perineal repair. Some authors have contended that

the morbidity following episiotomy is less than after frank lacerations. Either way, these are listed as morbidity because of the temperature, although the trouble is temporary and the end-results negative. Some patients had temperature rises on several days apart, such as the second, fifth, and ninth days. Sometimes such temperatures were 101° F. or higher, and yet they were signed out afebrile. It has happened that some of these women have at a later date returned to the hospital with extensive exudates or other serious pelvic pathology. We have in mind a woman who never ran a temperature above 100.2° F. but who developed a pelvic abscess that had to be drained. Although truly morbid she was not included in that class.

Polak conducted studies on morbidity following rectal and vaginal examinations. The difference was slight. However, he learned, in one series, that there was a morbidity rate of 95.9 per cent in women who had had neither vaginal nor rectal examinations and who delivered spontaneously. Suppose these figures stood without the explanation that all these women went into labor while suffering with severe upper respiratory infections and fearing a spread of the contamination no examinations were made. They would not really represent an obstetric morbidity. Nevertheless, in the tabulation of all our cases they are included in the morbidity class.

L. Grant Baldwin studied the subject of mercurochrome vaginal instillations prior to delivery and presented figures according to three standards of morbidity classification. The reported end-results were far apart according to each classification.

In our case we learned that our gross morbidity based on temperature was 7.8 per cent; that our corrected morbidity was 4.5 per cent; that from November to April 25 to 40 per cent of the morbidity was due to upper respiratory infections; that should we include with these, breast infections and infection of the kidney tract they would bring the rate up to 75 per cent; that on dismissal from the hospital less than 1 per cent had any obstetric pathology present; that according to our classification some cases had definite pathology but were not morbid according to the rules; that many were morbid from unknown causes which were never discovered. We could work out other ingenious angles, but after all is said and done we would prove nothing of any importance or accuracy, except, perhaps, that endless factors, some known, many unknown, will cause temperature.

Do not gather from these remarks that we would have you insensible to obstetric morbidity. It is an ever-present menace to childbearing. It is an elusive thing, at times hard to classify or explain. So many factors enter into it that often we can discover no one cause. Efforts must be continued to lessen true obstetric morbidity.

We have tried to point out that morbidity records based on temperature alone are confusing and inaccurate. For, after all, tempera-

ture is but a symptom as is pain, a foul lochia, a chill, and surely of no more importance than certain physical findings such as abdominal tenderness or distension, a peritoneal rebound, a pelvic mass, bacteria in the blood stream or a high differential and leucocyte count.

Therefore, we venture to offer for discussion other standards for computing obstetric morbidity. We would list as morbid every patient who gave evidence of any definite or prolonged pathologic condition with or without fever directly resulting from childbirth. We would exclude all intercurrent or incidental affections not crossing the borders of or impinging on the postpartum state. We would include all anatomical damage and mechanical derangements resulting from childbirth that would affect the health of the woman, i.e., inversion of the uterus, rupture of the uterus, cystocele, rectocele, prolapse of the uterus, a badly lacerated cervix, or unrepaired or broken down extensive laceration of the perineum, and all fistula in the genital tract. We would include all of these, whether found with rise of temperature or not. Any condition resulting from childbirth that causes any degree of prolonged ill health, that renders the woman more or less invalid, that may cause future sterility or make future childbearing a dangerous experience, we would list as morbidity. Fever, a likely and important factor in the symptom complex might be a means of arriving at the end, but would not be the end itself. Every case dismissed from the hospital should be reexamined a month or six weeks postpartum before the records are closed.

We have not attempted to formulate a fixed, rigid set of rules, but have offered these suggestions in broad outline, feeling that when other standards for computing obstetric morbidity than that of the one index of temperature now in use are accepted by all men, we will then have records of accuracy and practical worth.

842 UNION STREET.

Flusser, E.: Vulvitis Aphthosa. Monatschr. f. Kinderheilk. 43: 123, 1929.

Vulvitis aphthosa is defined as a lesion occurring about the vulva similar to that found in the stomatitis aphthosa of the mouth and derived from the latter. The author knows of no previous record of the condition, although stomatitis aphthosa is well known. The vulvitis aphthosa of the older writers had no connection with the lesion of the mouth but was identical with thrush or noma.

The case presented is that of an acutely ill child, seven years old, who acquired a severe stomatitis aphthosa, which was carried to the vulva manually. The lesion is described as being composed of red nodules 2 to 4 mm. in diameter, the larger ones having gray centers. Pustules with central umbilication are also seen. It extended over the mons, labia majora, labia minora, and mucous membrane of the vulva. The latter was thickened and angry red in color, and the hymen was also involved. Treatment consisted in neosalvarsan intravenously and was followed by almost immediate relief.

FRANK SPIELMAN.

VAGINAL REPAIR

By A. J. RONGY, M.D., NEW YORK, N. Y.

IN RECENT years gynecologists have assumed a different attitude toward vaginal repair during the childbearing period. Formerly vaginal repair was done indiscriminately, giving little thought to the complications that might arise during subsequent labors as a result of these operations. I believe that the predominating opinion now is to avoid vaginal plastic operations on women during the period of fertility.

However, there are many instances when vaginal repair must be performed during the childbearing period. Many women, as a result of difficult and ill-managed labors, suffer such great damage to the genital tract that they are physically disabled. Vaginal repair in such cases becomes an operation of necessity, not of choice.

It is not my purpose at this time to discuss the technic of any operative procedure or to give tables of statistics of the results obtained in given series of cases, or the relation which a particular operation may have on subsequent pregnancy and labor. I assume that at this stage of gynecologic surgery this would be superfluous and it would only be a repetition of subject matter in which medical literature abounds.

Once vaginal repair is decided upon, it is the function of the gynecologist to give consideration to some of the other aspects associated with these procedures beyond the immediate question of technic or type of operation to be performed. What then are some of the essential points which are to be taken into consideration in connection with vaginal repair? The following will be discussed catagorically:

1. The anatomic construction of the bony pelvic outlet.
2. The interpretation of the mechanics of labor.
3. The sexual function.
4. Surgical sterilization.
5. Prophylactic episiotomy.

1. The Bony Pelvic Outlet.—The success of vaginal repair, to a large degree, depends upon the correlation of the soft pelvic structures to the bony outlet of the pelvis. The formation of the pelvic outlet varies in different types of women. In normal cases a line drawn transversely across the ischial tuberosities divides the pelvic outlet into anterior and posterior segments. It will be found that the anterior segment measures about 7 cm. and the posterior segment about 9 cm. In some women, however, the anterior segment of the pelvic outlet is narrow and shortened. In others the reverse is true.

The damage to the soft pelvic structures, which takes place during labor, normal or abnormal, has a definite relationship to the type of pelvic outlet of the patient.

Women who have contracted anterior segments are less likely to develop a cystocele because the fetal head in these cases is born at the expense of the posterior segment. The subpubic structures, including the supports of the bladder wall, therefore escape the constant assault, which the head makes on the tissues of this region. It is the posterior segment or the structures composing the pelvic floor and perineum, which are likely to be torn.

Again, women in whom the posterior segment is contracted are more likely to have greater cystocele formation, because the head is born at the expense of the anterior segment.

In undertaking vaginal repair the anatomic peculiarities of the pelvic outlet must be borne in mind, because the reconstruction of the torn tissues and replacement of the genital organs must be carried out in accordance with the anatomic formation of the pelvic outlet.

In the vaginal fixation operation for procidentia the point of anchorage of the anterior wall of the uterus to the upper angle of the vagina, whether high, middle, or low, depends upon whether the anterior segment of the pelvic outlet is short or long. The extent of the separation of the bladder wall laterally is also greatly influenced by it. In these patients the uterus, not the bladder, forms the greater part of the hernia, and therefore there is no need of extensive separation of the bladder from the surrounding structures. What is primarily necessary in such a patient is a proper point of fixation of the uterus and as little separation of the bladder as is possible to finish the operation. This helps to preserve the bladder function and little vesical disturbance will follow the operation. The repair of the damaged posterior wall in these patients, however, must be complete. The line of denudation must extend sufficiently high to the point where the vagina and rectum are in juxtaposition, thus exposing the entire muscular structures of the pelvic floor. The suturing of the levator ani muscles must be begun at a point of their greatest divergence which is within the reach of the operator. A complete pelvic diaphragm will thus be made and it will prevent the uterus from sliding out again from the vagina.

In patients in whom the posterior segment is shortened the hernia is largely formed by the bladder. The uterus usually sags behind the bladder; the perineum is damaged comparatively little. In such cases the bladder separation must be carried out extensively. The fixation point of the uterus must be high near the fundus. The bladder is made to rest on the posterior wall of the uterus, thus making it impossible for the cystocele to recur. The narrowing of the vaginal canal must be accomplished at the expense of the anterior vaginal wall. The

perineum in these patients usually is not badly lacerated and therefore a simple type of perineorrhaphy is sufficient to complete the operation.

2. The Mechanics of Labor.—A proper conception of the mechanics of labor is necessary in order to carry through successfully the delivery of the fetal head with forceps.

We have been taught to interpret "position" as a mechanical necessity, a process by which the longest diameter of the head accommodates itself to the longest diameter of the pelvis. This is only partly true; the fetal head for all practical purposes is a true sphere and therefore must be governed by the same mechanical principles that govern the movements of a sphere. The complications that arise during labor in malpositions are due to the fact that the head loses the properties governing the motion of a sphere, because there is a lack of proper approximation of the fetal neck and the pubic arch. It is the degree of angulation of the neck and the proximity of the angulated portion of the neck to the pubic bone, which make it possible or impossible for the fetal head to follow the laws that govern the passage of a sphere through a cavity approximately of the same size and shape.

It is the lack of understanding of this principle in the mechanism of labor which makes the use of forceps dangerous and very often causes irreparable damage to the genital tract. The delivery of the head with forceps is impossible unless the head is in a position when the forceps in its grasp of the head is causing the proximal hemisphere of the head to become engaged. Any deviation from this principle in the use of forceps leads to great damage to the birth canal. The incidence of birth canal injuries is on the increase because of the injudicious use of forceps. The necessity for vaginal repair is therefore becoming more urgent.

3. Sexual Relationship.—Not infrequently husbands become impotent and are unable to copulate with their wives, but are quite virile and able to perform the sexual act with other women. For this, there are, of course, many reasons. It seems to me that in a number of instances the impotence of the husbands could be accounted for by the fact that they lack the necessary stimulation for the orgasm, because of the complete relaxation of the vaginal canal. They cease to enjoy the sexual act; this leads to impotence.

Some years ago I made inquiries from a number of husbands whose wives had undergone vaginal repair, whether they noticed any change in their sexual relationship. Many informed me that apparently their sexual powers had increased and they enjoyed the sexual act much more since their wives had been operated upon.

I then made a study of 100 individuals with the following results: 17 were impotent before the operation; 5 regained their virility, 14 remained impotent; 26 stated that sexual intercourse had become more pleasurable; 12 stated that they were able to have sexual intercourse

more frequently; 8 stated that the orgasm was somewhat more prolonged; and 45 noticed no change.

The women in this group noticed no change in the sexual act except that 9 women had varying degrees of dyspareunia, as a result of scarification and narrowing of the vaginal canal.

I am convinced that proper reconstruction of the vaginal vault does help to enhance the sexual powers of the husband in no small number of cases, especially in men who have passed middle age and whose sexual powers are on the wane. This alone not infrequently may be a sufficient reason for advising vaginal repair.

4. Surgical Sterilization.—No matter what opinions we may hold on the question of birth control, it is certain that there are definite indications from a purely medical standpoint for surgical sterilization in a large number of patients who came to operations for pelvic disorders. Furthermore, in a great number of patients pelvic repair would be futile and would lead to grave complications in the event of subsequent childbirth if they were not sterilized. Therefore sterilization has now become a routine procedure in the more aggravated cases of vaginal repair. Patients who require a vaginal fixation for partial or complete procidentia should be sterilized. If the patient is unwilling to be sterilized, the operation should not be undertaken and some other form of repair should be done.

In the course of my work I have found it necessary to sterilize a great many women. I have never sterilized a patient who had only two children, unless especially requested to do so by both husband and wife after they had deliberated and discussed the question thoroughly. Women who have three or more children I usually advise to be sterilized at the time of the operation.

I have had an unusual opportunity to observe a great number of patients who have been sterilized. I have watched them not only from the standpoint of altered physiologic function of the genital tract, but also as to their mental attitude and general psychologic reactions toward their children and husbands. Some of the women appeared as if they had received a new lease on life. A good many assumed a different attitude toward sexual relationship; they no longer abhorred and feared the approach of their husbands. With the exception of one patient none regretted that she had been sterilized.

Now, this may seem a liberal attitude on my part to assume concerning the question of surgical sterilization, but I believe that the time has come when the husband no longer will be able to consider it his right to gratify brutally his sexual desires without regard for his partner.

Sterilization can be accomplished easily through the vagina in cases of procidentia of the uterus; it does not unduly prolong the operation. The best method is that of resection of the fallopian tubes at their

isthmial portions, embedding the cut ends in the cornua of the uterus. During the past ten years sterilization by this method was performed by me in about 250 cases and there were only four failures reported.

5. *Prophylactic Episiotomy*.—In recent years obstetricians have advocated prophylactic episiotomy, either unilateral or bilateral, during the delivery of a child with forceps or before the delivery of the after-coming head. Proponents of this procedure claim that the preliminary incisions in the vaginal walls create a surgical wound, that the repair of such a wound can be done in a surgical manner, while if the perineum is torn spontaneously as the head or shoulders are being born the resulting wound is ragged and irregular and more difficult to repair.

There is, however, another phase to this procedure which the obstetrician fails to take into consideration. In a great number of patients the episiotomy wounds become secondarily infected, and healing does not take place by primary union. This results in cicatrization of muscular and fascial structures of the perineum. Vaginal repair in such cases very often cannot be performed properly because the anatomic structures of the vaginal vault are distorted, making it difficult to dissect the tissues correctly. Furthermore, even if repair is properly accomplished, the tissues are so devitalized that primary union does not take place in a great number of cases.

If the obstetrician thinks it necessary to do a preliminary incision of the perineum, I believe it more logical to perform a perineotomy. It can be more readily repaired than an episiotomy wound. If secondary infection takes place following a perineotomy, the structures are less distorted and secondary vaginal repair is therefore less complicated.

The type of operation to be performed for the correction of procidentia uteri is still a controversial question. I have had ample opportunity to observe the results of the various operations now utilized for the cure of the dislocated genital tract, and have come definitely to the conclusion that the vaginal fixation operation or what is popularly termed the interposition operation, properly executed in selected cases, will cure the largest number of patients.

Some gynecologists object to this operation because they claim that a great many patients have vesical disturbance following it. Others are disinclined to perform it because of the technical difficulties that may be encountered during the operation. Nevertheless, I believe that these obstacles can be easily overcome by those who have acquired the necessary experience in performing plastic operations on the genital tract.

The only criteria for the efficacy of any procedure for the correction of the prolapsed genital organs are: (1) The permanency of the repair, and (2) the return of the parts involved to normal function

and position. This is more readily accomplished by the vaginal fixation operation. When this operation is performed in women during their period of fertility, sterilization should be done, for a labor subsequent to this operation may endanger the life of the mother.

The choice of anesthesia is important in this group of cases. A great many of these patients have passed middle age; some of them come to operation in the sixth or seventh decade of life and give a history of having suffered from procidentia ten or more years. Due to prolonged congestion and irritation the parts have become thickened; they have lost their normal sensitiveness. It is therefore not uncommon to find that a goodly number of cases do not require any anesthesia whatsoever for the operation. Surely a very large percentage of these patients can be operated upon under local anesthesia.

The following case illustrates that vaginal fixation can be performed without anesthesia:

Mrs. M. C., aged forty-eight, para viii, admitted to Lebanon Hospital, July 30, 1930, giving a history of difficulty of urination for the past four years. Since the birth of the last child nine years ago, she had complained of frequency of micturition, having to get up three or four times at night. For the past five years she had felt the "womb" protruding from the vagina. Menopause January, 1930. She had been admitted previously to the hospital, but operation was not done because of complicating nephritis and hypertension. Local examination disclosed a complete prolapse of the uterus. Operation July 31, 1930. No anesthesia, except a preliminary dose of morphine, gr. $\frac{1}{6}$. Operation began at 11 A.M., ended 11:40 A.M. Blood pressure on the morning of operation was 210/108. Urine negative. R.B.C. 3,650,000, hemoglobin 60 per cent, W.B.C. 5,900. The patient was discharged from the hospital August 13.

590 WEST END AVENUE.

Halban, J., and Spitzer, M. Z.: The Increased Growth of the Nails During Pregnancy. *Monatschr. f. Geburtsh. u. Gynäk.* 82: 25, 1929.

During pregnancy there is not only a purposeful growth impulse such as is evidenced in uterus, vagina, and breasts but also a general growth such as is manifest in the increase in height in young gravidas. The hair likewise grows more rapidly during gestation and this fact caused the authors to investigate the growth of the finger nails during pregnancy. A review of the literature failed to reveal any similar study during normal pregnancy. The authors carefully measured the nails of many pregnant women and they report the results in a careful study of 93 women. For normal standards they accepted the results of others who studied nonpregnant individuals and they themselves measured the growth of nails in 23 nonpregnant women. The conclusion reached was that during pregnancy the growth of the finger nails is about one-fourth to one-third greater than it is in the nonpregnant state. This increase begins soon after conception takes place. As soon as the pregnancy is ended, be it at full term, by premature labor, or by abortion, the rapid growth ceases suddenly and the increase in length progresses more slowly than normally for a while. The authors found that a few women failed to show this phenomenon during pregnancy.

J. P. GREENHILL.

OBSERVATIONS ON TOXEMIC NEPHRITIC GROUP CASES WITH SPECIAL REFERENCE TO CLASSIFICATION

BY FOSTER S. KELLOGG, M.D., BOSTON, MASS.

FROM 1919 to 1928 I published six papers* based on studies made with the view of clarifying this subject in my mind.

Briefly and as applied to this phase the results of the work may be stated chronologically as follows: (1) Recognition of the need for accurate definition in this group for proper treatment, which we lack to a marked degree. (2) The autopsy proof of the entity "recurrent toxemia." (3) The definition of the term "recurrent toxemia." (4) A proposal to index tentatively all these cases under three heads for future study: (a) Acute toxemia. (b) Pregnancy complicating chronic nephritis. (c) Recurrent toxemia. (5) An expression of disagreement with the dictum that toxemia leads to chronic nephritis, and the postulation of the theory that in the majority of instances an insufficient kidney, not demonstrable by our relatively coarse tests, exists before the pregnancy, and that pregnancy is the best available test of kidney function. (6) That a cooperative study throughout the United States under a single classification is highly desirable. (7) That from a study of 1200 cases the only improvement we could find of results had come from active interference *before* the convulsive stage in the toxemia patients and before marked kidney damage, as shown by blood chemistry and eye-ground changes, in the chronic nephritic patients. (8) That there is no profit in babies and progressive maternal damage in attempts to carry definitely established nephritic patients through pregnancy, and that they should be segregated and sterilized or put under effective pregnancy prevention. (9) That the recurrent group gives a 50 per cent profit in babies without damage to the mother, if properly handled. (10) We emphasized the close relationship between mild, severe, eclamptic toxemia, and premature separation of the normally implanted placenta. We called attention to the hitherto unnoted importance of anuria as a cause of death in these cases, brought out the paucity of autopsy material and our ignorance of just what happens in the kidney, and attempted a tentative rationale of treatment.

Owing to the interest of the chief a special toxemic clinic was established at the Boston Lying-In Hospital in August, 1925. In expectation of this we had kept a special index beginning June, 1923, so that we were able to use our material retroactive to that date. Further on I shall report some of the results seen in this clinic from June, 1923, to June, 1930, a period of seven years.

*The references to these publications may be found in the bibliography.

In the meanwhile unquestionably the outstanding piece of work in the world in the study of toxemias, at least from the angle of classification, was being accomplished. This work was taking place at the Johns Hopkins University Medical School and it culminated in 1929 with the publication of a monograph called "The Toxemias of Pregnancy," by H. J. Stander. Williams and Stander had recognized the positive need for such a classification. It is impossible to overestimate the value of this contribution.

For reasons immediately to be outlined this classification should be for the present limited as follows:

1. Low reserve kidney.
2. Nephritis complicating pregnancy.
3. Preeclampsia.
4. Eclampsia.

Stander himself has demonstrated that "vomiting of pregnancy" (number one in the original classification) does not belong in the classification. He has reproduced by starvation the lesions of this condition, including central necrosis of the liver, and believes that it should be omitted.

Group six in the original classification, "acute yellow atrophy of the liver," is not peculiar to pregnancy, and, since we are concerned with toxemias peculiar to pregnancy or with nephritis as a complication of pregnancy, we believe it should be excluded and considered as a separate entity.

Permit me to make three dogmatic statements regarding this classification: (1) It obviously does not cover all the material seen in this group. (2) So far as it goes, it appears to be soundly scientific even though somewhat arbitrarily conceived. (3) Since to date it is the only classification based on sound scientific study and keen experienced clinical observation, it seems most desirable that it should be universally accepted for the present in the United States as a basis for the study of this group. With this feeling it is my intention to attempt in the future to reconcile, in so far as we are able, each case passing through our clinic with this classification.

Such minor criticisms of this classification as I have to make will become apparent in a report of the results from our clinic. These criticisms are intended to be purely constructive and purely suggestive and in this spirit I am sure they will be taken.

The figures which I am about to give must be brief. To those interested in detail, complete tables may be found in a paper by Berman called "Observations in the Toxemic Clinie, Boston Lying-In Hospital," noted in the bibliography.

In the seven years of the clinic approximately 1100 separate toxemic-nephritic patients were observed. Of these, for lack of sufficiently com-

plete study and on the only data available, 15 per cent were set down as chronic nephritis, 50 per cent were set down as acute toxemia, and 35 per cent as recurrent toxemia. The criteria for a chronic nephritic patient in the clinic is that a patient shall have a persistently elevated blood pressure one year after delivery, eyeground changes, and fixation of specific gravity. We may dismiss this group and the figures as practically unworthy of consideration, since we have insisted that without careful interval study or without study in two or more pregnancies, we are totally at sea as to where these patients truly belong.

We come, then, to a group of 293 patients who have been seen or studied in two or more pregnancies.

Of these, 164 have been carefully observed between pregnancies. Our only observation on the interval study cases, and we offer no explanation of our figures, is this: that of the patients who came to us with albuminuria as well as hypertension when pregnant, about 25 per cent came back with definitely elevated blood pressure during the interval study. In the group of patients with hypertension and no albuminuria, about 50 per cent came back with elevated pressure in the interval study.

In a group of 225 patients seen in two pregnancies only, but 20 per cent were normal throughout the second pregnancy and so may be called acute toxemia patients, at least so far as we have gone with them. Eighty per cent showed a recurrence of albuminuria and elevated blood pressure. Of these, 20 per cent approximately were established nephritic patients; 10 per cent were doubtful, because, though they maintained hypertension at the end of a year, they showed no eyeground changes or fixation of specific gravity, and 50 per cent are listed as recurrent toxemias; i.e., patients in whom chronic nephritis cannot be diagnosed, even with the help of pregnancy as a test.

There were 68 patients seen in more than two pregnancies. We have a general impression from this group that, on the whole, as progressive pregnancies occur, the patients tend to get worse earlier in pregnancy and that we are able to demonstrate with added pregnancies more and more established nephritic patients.

Berman shows by study of the group of 293 patients observed in two or more pregnancies that with increasing parity there is a rise in the incidence of recurrences and nephritis and a decrease of normal pregnancies. He points out that the group with 140 to 160 blood pressure level without albuminuria seems to occupy the place of paramount importance in this progressive degeneration. We have the firm impression from this that ultimately we shall find a group of women, using pregnancy as a test, who demonstrate familial cardiovascular insufficiency. We believe that in order to check this and give them their best chance for a reasonably prolonged life, we may be obliged to segregate and steri-

lize or otherwise prevent too great a succession of pregnancies, precisely as in the established chronic nephritic patients, though without the ability to make that diagnosis.

We will now attempt to reconcile our 293 repeat cases with the Hopkins classification. We find 26 per cent that may be classified as low reserve kidney, and in this group we include some cases less in severity than the criteria for this group call for. Our chronic nephritic patients represent 20 per cent. Our eclamptic patients represent 9 per cent. Our doubtful cases represent 10 per cent. This leaves us with 35 per cent of cases which we cannot consider as low reserve kidney. Similar behavior in repeat pregnancies is the Hopkins requirement for low reserve kidney. This 35 per cent did not so behave.

The Hopkins classification states that only 5 per cent of cases are preeclamptic toxemia. This is our major criticism of the Hopkins classification and its implied teaching. Somehow this 30 per cent difference must be reconciled. According to the Hopkins percentages 35 per cent of the group is left to be divided between vomiting, yellow atrophy, and eclampsia. We think this too high for eclampsia and that it substantiates the point we are about to develop. We believe it incorrect teaching in a country in which, according to Stander's monograph, 26 per cent of maternal deaths are due to so-called toxemias of pregnancy, to state that so great a group of albuminuric-hypertension cases may be trusted not to go on to eclampsia. We prefer to assume and to teach that every albuminuric or hypertension case is a potential eclamptic. Before the publication of this paper, Irving will have shown that in the past ten years the mortality in eclampsia at the Boston Lying-In Hospital has improved very little except by the elimination of shock deaths by rapid delivery or cesarean section, save for a series treated by him by plasmapheresis, too small and too experimental to consider yet, but very encouraging. Otherwise, our best mortality rate by conservative methods is 20 per cent. We observe throughout the state of Massachusetts and must conclude from the published statistics of the country that toxemias without convulsions or preeclamptic toxemias or whatever people may care to call them, are carried too far without interference with pregnancy. In our own hospital we have only saved lives to any marked extent by interruption of pregnancy prior to the convulsive stage. Therefore, while we do admit the academic existence of the low reserve kidney group, we feel strongly that it should not be preached for public consumption until more facile methods are put forth for its ready and certain identification. We think the term preeclamptic toxemia should be used to cover a broader field than as now defined in the Stander monograph. We fancy the term with its implication of impending eclampsia and its indication for ceaseless watchfulness.

CONCLUSIONS

We believe we are justified in drawing the following conclusions:

1. That a classification of the toxemic nephritic group is an essential in this, the most important problem in obstetrics.
2. That the Hopkins classification is so sound and so much in advance of anything that has preceded it that it should be adopted in every clinic in the United States.
3. That an organization to meet once a year and discuss this group in a cooperative manner will further rapid progress in the solution of the problem more than anything else.
4. That at present there appears to be a marked discrepancy in the proportions of the "preeclamptic toxemia" group in the two studies. An explanation may be that we are too purely clinical or that the Hopkins scheme is too purely scientific in case requirements to fit this group. I suspect it is a little of both. At all events since the crux of treatment at present lies in this group, we must make every effort to reconcile our figures.
5. That all of us as enthusiasts should be slow to promulgate theories of special treatment of eclampsia and for the present, until we have gathered sufficient data, we should concentrate all our teaching effort toward the principle of preventing convulsive toxemia, first by the customary slogan of prenatal care, and to my mind, the still more important principle of *preconclusive interference*.

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19 BAY STATE ROAD.

Hofbauer, J.: Treatment of Pyelitis Gravidarum. Arch. f. Gynäk. 134: 205, 1928.

Hofbauer feels that the oral or intravenous administration of antiseptics in acute pyelitis gravidarum is contraindicated because of the involvement of the adjacent kidney parenchyma. The diet should be regulated so as to exclude all albumins and to include large quantities of vegetables and of milk sugar. Pituitary extract has a specific antiphlogistic action upon the urinary tract and increases ureteral and vesical peristalsis. The author has never seen a pregnancy disturbed nor terminated by such pituitary extract injections. He uses three daily injections of the pituitary extract (one-half ampule of pituitrin) with very good results.

RALPH A. REIS.

APPLICATION IN FORCEPS EXTRACTION

BY PAUL T. HARPER, M.D., ALBANY, N. Y.

CHOICE of the above subject for presentation before the Association springs from a conviction that none other than cephalic application should be taught.

It is believed that oblique-cephalic and pelvic applications entail disadvantages and dangers that nothing less than stern necessity would seem to warrant, and that they should be relegated to the category of emergency measures as scientifically unsound as forcible dilatation of the cervix and as little less hazardous to the child than version and bringing-down of the half-breech in the control of hemorrhage due to incomplete placenta previa.

Discussion is limited to consideration of cases wherein the head is engaged,—in other words, wherein the biparietal diameter is in the inlet. At higher levels, heads are unengaged, or “floating,” and to them it is presumed forceps application would not be considered. Below the inlet, cephalic application alone need be considered. The instances wherein even an initial oblique-cephalic application is necessary are extremely rare.

Of true cephalic application it may be said: First, it is safe. With the head grasped by its biparietal diameter, firm instrumental pressures are exerted over resistant bony prominences,—the parietal eminences, and the malar and zygomatic processes. Second, true cephalic application is possible only as the exact position of the occiput is known; and such information is demanded if one would know the extent and direction of rotation that must follow. Third, true cephalic application is possible in practically every case where forceps advance is desirable.

Cephalic application is known to be safe, and it is conceded that knowledge of the exact location of the occiput is essential to the intelligent conduct of forceps operations.

But it will not be readily granted that other than cephalic application is practically never necessary where operative advance is desired: and this for two reasons. First, in rare instances the initial application may have to be oblique-cephalic; and second, there is far from universal accord with the proposition that, where a difficult instrumental advance threatens, delivery by elective version and extraction is superior to delivery by forceps.

At any rate, perfect cephalic application is far from the rule. From experience in hospitals where specialists and general practitioners are conducting cases, it would seem that pelvic and oblique-cephalic ap-

pllications are not uncommon, not merely as initial applications made necessary by high position of heads but also as applications too often persisted in until delivery has been accomplished.

Reasons for the frequency of imperfect applications are easy to discover. First, oblique-cephalic and pelvic applications are easier to make and, second, each has a time-honored place in the literature.

There is little incentive for the indifferent operator to master the details of orientation of the occiput and perfect cephalic application when there is standard textbook authority for "inserting the blades at the sides of the maternal pelvis and, without knowledge of position of the occiput, grasping the head, when the latter is known to be high." Thereafter, if the grasp is firm, especially if fenestrated blades are used and, finally, if sufficiently strong tractile efforts are made, all know that a successful advance is practically assured.

True, the operator is directed to reapply the forceps cephalically when the level of the midpelvis is reached; but such is believed to be far from the rule. Again, the operator might claim that an application that was permissible at the beginning of an instrumental advance might be quite reasonably held until delivery was accomplished; and he would not be wholly illogical in his contention.

The high percentage of oblique-cephalic applications seen in consultation convinces one that cephalic application even in midpelvic arrest of "posteriors" is far from the rule.

There is unquestionably an attitude of general indifference toward the method of applying forceps and for this condition teachers must assume the essential responsibility.

But granted that there is a place for other than perfect cephalic application. Hypothetical cases of high arrest of the head, wherein oblique-cephalic or pelvic application is required, at once suggest themselves. For example, with arrest in the transverse diameter of the inlet, pelvic application alone may seem possible. Again, with arrest in an oblique diameter of the inlet, an oblique-cephalic application may be the best. It is assumed that one or another of the conventional forceps is being used.

Now, presume instrumental advance to have been determined upon. Certain disadvantages and dangers appear. They are familiar. They obtain even though the operator is skilled. Briefly considered, they are as follows:

With a pelvic application to well-flexed heads, the sincipital blade slips over the "long" face while the tip of the other blade exerts dangerous pressure at the base of the "short" occiput. Grasp on the head is insecure, especially when the solid blade forceps is used, and it results in inevitable facial traumatisms when compensated for by tightening the grasp on the handles. Even more undesirable are the

results when a fenestrated-blade instrument is used, for the reason that it can be made to hold no matter how applied.

On the other hand, with pelvic application to deflexed heads, the hold is more secure, because the curves of the sinciput and the occiput conform reasonably well to the cephalic curves of the blades. It is not too secure, however, because the tips are widely separated, due to the long head-diameters grasped. A mechanical defect of this application, at least worthy of mention in this connection, is the possible lengthening of the biparietal (the engaging) diameter as the result of pressure on the sincipital and the occipital blades.

While oblique-cephalic application is responsible for fewer basal injuries than is pelvic, pressures over a stylomastoid foramen with facial-nerve damage at its exit therefrom are common, as are also laceration and contusion about the opposite orbit. Further, remembering that the forceps blades are parallel when locked, it is inevitable that firm localized pressures are exerted by the anterior edge of one blade and by the posterior edge of the other when applied obliquely to the head. The edges contuse in every case. They cut when the grasp is firm and traction is strong enough.

But still presume instrumental advance to have been determined upon. A perfect cephalic application in inlet arrest is possible, provided one chooses either the Kjelland or the Barton forceps.

While the Kjelland can unquestionably be applied cephalically at the inlet and while its sliding lock assures perfect application even to asynclitic heads, there would seem to be little more to say for the Kjelland in this connection. For the direction of initial advance occasioned is nonphysiologic. The handles of the "straight" Kjelland when applied high cannot be directed far enough posteriorly for the head to advance downward and backward in a line perpendicular to the plane of the pelvic inlet. The Kjelland forceps has a place in the obstetric armamentarium; but its field is other than inlet arrest.

On the other hand, the Barton forceps not only makes perfect cephalic application to heads at the inlet possible but also,—and this is most important,—it assures an initial advance in the physiologic direction; namely, downward and backward. Limited personal experience with the Barton forceps in inlet arrest, occasioned by fear of partial separation of low-lying placentas and cord prolapse at sweep of the anterior blade through an arc of 180°, makes it impossible for me to do ample justice to this instrument.

But those familiar with the Barton forceps claim the accidents mentioned do not occur. They are possibilities, however, that make it incumbent upon those learning the use of the Barton instrument to proceed cautiously.

All things considered, the child is unquestionably a better risk advancing by the head (through traction on forceps) than by the breech

(following version). Likewise, it will be conceded that, in the hands of the average operator, a head-advance that can be produced as deliberately as one chooses will continue to entail a lower fetal mortality than an advance by the breech (following version), that of necessity must be relatively rapid.

For these reasons, the question of efficient and safe forceps application in inlet arrest demands attention. The Barton forceps is suggested as a possible answer. The instrument certainly merits thorough investigation and exhaustive test.

But advance in inlet arrest is possible without making a choice between pelvic and oblique-cephalic application of conventional forceps or even without selection being made of one of the newer forceps that assures a perfect cephalic application. Delivery may be effected by internal podalic version and breech extraction.

Granted the "version" is truly elective in that it is done after maximum second-stage moulding, and granted, further, the operator has mastered the essentials of the Potter technic, delivery by version and extraction promises more in inlet arrest than does delivery by the vertex. At least I know that my own results, in terms of cervical laceration, asphyxia, and cerebral injury have improved by wider use of version and extraction in the type of case referred to.

What has just preceded is not intended as an appeal for the delivery of all high-arrested heads by version and extraction. Even less does it mean that the operator should learn version through repeated and unsupervised personal experience with cases so conducted. The beginner or the one with limited operative experience will unquestionably meet with lower mortality rates where arrest is met by a forceps-advance rather than by a breech extraction following version. There is no situation in practice that calls for more niceties in judgment and skill in execution than does delivery by "version and extraction"; and with this sentiment it is believed practically all obstetricians will be in accord.

At the same time, either "high forceps" or delivery by elective version and extraction is the procedure of choice in inlet arrest; and it remains for extended discussion to determine which. But, until such agreement has been arrived at, the full possibilities and the limitations of each must be taught.

Summarizing what has preceded, the following is offered in support of the contention that "none other than cephalic application should be taught."

A. In all medium and low forceps operations cephalic application is possible. It is acknowledged to be safe, occasioning the minimum of fetal injuries.

All "persistent posteriors" are deliverable by inverted cephalic application and the Scanzoni maneuver, or by single blade rotation and, secondary, true cephalic application as the alternative procedure.

Here, other than cephalic application is both unnecessary and unsafe.

Cephalic application is possible even in "deep transverse arrest of posteriors." Here, oblique-cephalic and pelvic applications are not only unsafe, they are scientifically unsound. What is needed in these cases is, primarily, rotation and, subsequently, advance. The presenting part is made to retrace its pathologic steps. It is made to recede to the level of the midpelvis where cephalic application is possible and, from which level, an uneventful advance can be effected.

Again, there is no occasion for considering other than cephalic application.

b. In high forceps operations cephalic application,—or at least a close approximation to it,—is always possible, provided the head rests in one or the other oblique. Accordingly this alone should be considered here.

With arrest in the transverse diameter of the inlet, three procedures are available:

First, an oblique application, persisted in only until the level of the high-midpelvis is reached, when true cephalic application can be made.

Second, perfect cephalic application, made possible by using either the Kjelland or the Barton forceps.

Third, delivery by version and extraction.

There would appear to be no place for pelvic application, while oblique-cephalic application meets the requirements of the rare case wherein a slight advance must be occasioned before perfect cephalic application is possible.

CONCLUSIONS

1. Cephalic application is scientifically sound; it is safe; and it is all-sufficient in that it is obtainable in practically every instance. For these reasons it is the only application that should be taught.

2. Pelvic application is mechanically inefficient; it is dangerous; and it is unnecessary. In the rare instances where it is the only application that seems possible, delivery should be effected by version and extraction. It should be mentioned only to be condemned.

3. Oblique-cephalic application, while it meets the mechanical needs of the occasional situation, is so apt to result in fetal head injuries that it is not entitled to be accorded the distinction of an essential (primary) application. Rather, let "oblique placing of the blades" be presented as an expedient, reluctantly but nevertheless necessarily employed to produce initial advance at the pelvic inlet.

4. The Kjelland and the Barton forceps merit thorough trials as means of effecting delivery with perfect cephalic application to high heads.

5. There is need for dispassioned consideration of the utility of internal podalic version and breech extraction in obviating the hazards of dangerous high forceps operations.

The obstetric forceps is something more than a mechanical means more or less reluctantly used,—too often with fetal and maternal injury,—to overcome the difficulties of obstructed labor. Rather, it is an instrument of precision, the proper use of which can be counted upon to lower the morbidity and the mortality that so often attend parturition; and what has gone before is offered as a contribution toward establishing it as such.

289 STATE STREET.

MATIN SLEEP

BY GEORGE F. CHANDLER, M.D., F.A.C.S., KINGSTON, N. Y.

MATIN sleep anesthesia is the name I have given to the method of routinely administering ten grains of luminal to adult patients between the hours of nine and twelve the night preceding an operation and followed with gas-ether at operation in the morning. Between the ages of twelve and twenty-one, five grains of luminal are given, and between the ages of five and ten, two grains.

In the morning the patients come to the operating room in a drowsy condition having slept the night through. In other words, it is a delightful morning sleep.

While hunting around for a descriptive name, the word *matin*, meaning morning was suggested to me. I began using this name and it is remarkable how readily it has been taken up by patients and nurses. In fact, in our part of the state, it has made as much of a hit with the lay people as the name "twilight sleep" did some years ago.

I do not claim to be the originator of giving luminal before anesthesia, for I understand that small doses of it have long been used in Germany three or four hours before local anesthesia and I have also found that several men in this country have been using luminal before general anesthesia as well as before local anesthesia in varying doses and at various hours preceding operation, but I do believe that the routine giving of ten grains of luminal twelve hours before operation (that is on the evening before) to produce a dreamy sleep on the morning of operation is a new procedure.

I first started using luminal at about six or seven o'clock the morning of the operation in large doses, going as high as fifteen grains. At about the time that I did this, I read an article by Willard Bartlett which appeared as an editorial in the April number of *Surgery, Gynecology and Obstetrics* in which he advocated even larger doses given three hours before gas-ether anesthesia. Another article of his has appeared since then in the same journal.

I tried his method but am satisfied that a large dose a few hours before operation is not so favorable to the patient nor does it achieve

so quiescent an after effect as when given the evening before. I also experimented with a divided ten grain dose, giving five at night and five in the morning of the operation. This method, too, I discarded.

After experimenting with these different methods of administration in over 160 cases, I have finally concluded that ten grains given anywhere from twelve to fifteen hours before operation is the ideal dose and the ideal time.

Surgery, as we know, has passed through many stages. Before the advent of ether and chloroform it was a brutal though necessary procedure. When I began giving ether in 1892, we used a cone made of newspaper and a towel pinned together with safety pins, one end of the cone being closed and stuffed with cotton into which the ether (not so pure) was poured. We then jammed this cone over the patient's face, everyone lent a hand in holding him down, and he was practically suffocated into unconsciousness. All the older men can well remember it being done this way in the larger hospitals of New York City. But, as in everything else, time and experience have brought refinements until now with the open cone method and gas-ether or ethylene administration by apparatus, the procedure has become almost perfect for the comfort of the patient and the convenience of the operator. In spite of all these advances there is still a mental hazard for the patient that must be considered in operating. I am sure that we do not give enough thought to this phase of the work.

People in the United States are today apparently in a more nervous state than formerly, particularly in matters concerning health. Radio talks, articles in newspapers written by physicians, the insidious advertising of the drug manufacturers, all have had their influence. Consequently, the thought of an operation seems to unbalance their nervous systems more than formerly. This condition must be recognized and given great consideration by a surgeon.

To us, surgery becomes routine. Nurses and doctors are more or less callous and cannot understand why anybody should feel worried about an operation. But for the patient there is a worry and a very decided one and this worry retards convalescence and should be considered of vital importance. I think that there is a mental hazard of from 10 to 25 per cent. This thing is not new. We have all recognized this and have used morphine, scopolamine, bromides and other drugs to overcome it. I am bringing to your attention now what I believe to be the best method that I have found to overcome this hazard of the mind.

After a diagnosis has been made in the office and the patient is told that an operation of election is necessary, he or she begins at once to be highly nervous even if never so before, and this condition obtains until the time of operation. Every surgeon recognizes this and at times gives sedatives to his patients to quiet them until they come to

the hospital. The admission to a hospital as a patient is a very momentous step to most people.

I now tell my patients that as soon as they shall have entered the hospital and are taken to their rooms, they will be given "some medicine" and will fall asleep at once, rest all night, and will not know or care when they are going to the operating room.

As soon as the patient has been put to bed, the nurse gives her ten grains of luminal mixed with a little elixir-lacto-peptine and within half an hour or an hour she is asleep and continues quietly through the night and can be prepared for operation early in the morning without becoming aroused.

The patient comes to the operating room in a care-free, somnolent state, will speak if spoken to, but if not disturbed, remains very drowsy. A few whiffs of gas are given and my ether records show that about one-third of the amount of ether formerly used is sufficient. The operation finished, the patient is returned to the room still quiet and peaceful. There is practically no nausea for very little ether has been given. For pain, a small amount of morphine is given, possibly $\frac{1}{8}$ grain and this seems to be enough. The patient then rests quietly all day, all through the night and usually through the next day.

On the third day she is as bright as a dollar, feels wonderful, and the convalescence is so much quicker and better than of old that those in the hospital who were skeptical at first are now all sold on this method.

The patients themselves are delighted. They remember little about the operation from the time they enter the hospital up until about the third day and then when they find out it is all over with so little suffering, they are in such an exalted state that they carry through, make a quick, sure recovery, and leave the hospital in a frame of mind that is very pleasing to all concerned.

I have tried nearly every kind of anesthesia in elective cases but now use luminal twelve hours before them all. I find it of great benefit preceding local anesthesia.

I have used spinal anesthesia, and while it is remarkably successful, still the nervous shock to the patient makes me hesitate to use it routinely. I am thoroughly convinced that patients do not convalesce as well following spinal anesthesia as they do after matin sleep. It is quite an ordeal for them to go through even though morphine has been given. They feel faint at times and want sips of water. The knowledge that they cannot move their legs worries them. They have to be talked to and some of them must be constantly reassured that everything is going well. They are conscious that they are being operated upon. They overhear any remark from the surgeon. They know how much time the operation requires and the mental impression is more or less lasting. I have talked with patients who have been operated

upon by excellent surgeons under spinal anesthesia and I find that most of them did not recover as quickly as I think they should. I have found this to be so in my own cases.

I admit that some patients are very much pleased with it but these I have found are invariably individuals of phlegmatic temperament, not at all emotional or excitable. Generally speaking, I would say that the surgeon who uses spinal anesthesia is more pleased with it than are the patients on whom he operates.

I have asked many doctors of my acquaintance if they would be willing to have spinal anesthesia used upon themselves and have heard only two say that they would, though many of them employ it.

Luminal, which is known chemically as phenyl-ethyl-mal-on-y lurea, is a member of the barbituric acid series of hypnotics, the first of which, veronal, was discovered by Emil Fischer and Joseph von Mering in 1904. By most authors luminal is considered the most powerful of the barbituric acid hypnotics.

The pharmacology of luminal-sodium was first studied by Dr. E. Impens in 1912. As in natural sleep, the hypnotic action of luminal has been found to be accompanied by a reduction in blood pressure and pulse rate.

Prolonged use of luminal or luminal-sodium in small doses or the administration of large doses over a shorter period may cause untoward symptoms, particularly in hypersusceptible persons. The most frequent reaction recorded in the literature is a cutaneous eruption resembling measles, scarlet fever or urticaria, usually attributed to an idiosyncrasy, but possibly related to the cutaneous vasodilatation produced by luminal. As a rule, this disappears spontaneously or after the discontinuance of the drug or reduction of the dose. It apparently occurs in from 1 to 3 per cent of patients, Grinker having observed a rash in 6 of 200 patients, Sexauer and Bell in 2 of 400, and Rowe in 1 of 56 epileptics, who received the drug every day morning and night. Under the use of the larger doses, 5 grains or more, relatively prolonged drowsiness may be observed and occasionally there are vertigo, headache, and nausea. Delirium, stupor, and ataxia may result from continuous use of excessive amounts.

A comprehensive review of the literature by Gruber, Shackelford and Ecklund disclosed only four possible deaths from luminal which these authors state were probably not wholly due to the drug but to other causes. One of the patients took 154 grains and another 308 grains of luminal with $\frac{1}{3}$ oz. tincture of opium for suicidal purposes. These authors conclude that luminal is not atoxic but that it is relatively nontoxic when given properly, the range between the therapeutic and toxic doses being large. Patients have taken more than 50 grains of luminal in a single dose without fatal results. McNeethney

reported a case of an epileptic woman who took 75 grains in an insane moment, slept for eighty hours, and recovered fully thereafter.

I saw one patient who took 70 grains for suicidal purposes. He slept for forty hours with no bad effects.

To sum up: matin sleep eliminates the mental hazard. It allays the preliminary worry, puts the patient absolutely and securely at ease during that first dreadful night of anxiety. Going to the operating room is of no importance to him. The use of only about one-third the usual amount of ether is necessary. Since so little ether is used, there is practically no vomiting. Very little morphine is necessary—sometimes none at all, so there is no blocking up of elimination. Patients are quiescent for two days following the operation. The time passes quickly for them and the convalescence is more pleasant. Finally, the operation has been performed with no apparent mental shock.

11 EAST CHESTNUT STREET.

Sakuma, H.: Experimental Study on the Excretory Function of the Uterine Mucosa. Part III. Biological Observation. Japanese J. Obst. & Gynec. 11: 112, 1928.

The author performed the following experiments: He injected colloidal iron, colloidal silver, mercury, lead, phosphorus, nicotine, arsenic, and potassium iodid into rabbits. Then 0.2 to 0.3 c.c. of the secretion of the uterine mucosa were obtained from these animals and spermatozoa were mixed with the endometrial secretion. In the secretion of normal rabbits spermatozoa showed a great decrease in their activity in four to six hours and their activity ceased entirely after eleven and one-fourth hours. Spermatozoa were found to survive longer than this in 0.7 per cent saline solution. In the endometrial secretion of animals given hydrochloric acid, or olive oil or injections of potassium iodid, the activity of spermatozoa persisted as long as in the secretion of untreated animals. The life of the spermatozoa was very greatly shortened, however, by being mixed with the uterine secretions from rabbits to which lead, nicotine, and yellow phosphorus had been administered. The author also studied the effect of the injection of the substances above mentioned on the fertility of rabbits. He found that in normal rabbits the incidence of pregnancy was 70 per cent and the incidence of abortion and premature labor was 14.2 per cent. In the rabbits treated with lead, pregnancies occurred in only 40 per cent and every animal aborted. In those treated with yellow phosphorus only 20 per cent became pregnant and likewise all aborted, and in the rabbits treated with nicotine 40 per cent became pregnant and 25 per cent had abortions.

J. P. GREENHILL.

REPORT OF THE COMMITTEE ON MATERNAL WELFARE, OF THE AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS, AND ABDOMINAL SURGEONS

IN SUBMITTING this report for 1930, the committee has studied more particularly the vital statistic tables of the United States and has briefly alluded to some good work done on this important subject in Canada and England.

In the registration area of the United States, the figures so far available for 1929 show no reduction, or at best very little, in the death rate seen from all puerperal causes, notwithstanding the efforts and labors of various Bureaus of all sorts and kinds. The mortality in the United States in 1927 was 2.5 per cent per 1000 for living babies, the same figures as were seen in 1928 and one-tenth per cent higher than it was for the years 1924, 1925, and 1926; and the final figures for 1928 as compared with 1927 show eighteen states with a higher death rate from puerperal septicemia, sixteen with a lower rate, and six with the same death rate, while four states still remain out and unrecorded of our total forty-eight states.

The mortality from causes other than septicemia increased (as shown in the final report of 1928 for the registration area) to 4.4 for live babies, as compared with 4.0 in 1927, which year showed the highest death rate from such causes since 1920.

In twenty-three states, the death rate from puerperal septicemia was higher in 1928 than it was in 1927; it was lower in fourteen states and in three it remained the same.

The 1928 table for all puerperal causes other than septicemia in the cities in the registration area was 4.6 as compared with 4.2 per 1000 live babies for the rural parts of the area and for septicemia 3.1 and 2.0, respectively.

Canada's maternal death rate for the past three years has remained stationary at 5.6 per 1000 live babies, according to published reports.

In May of this year the United States Public Health Service inaugurated a current state mortality report system and published in the weekly Public Health Reports a table of specific mortality rates for each state for a period covering as many months of the current calendar year as were available to the date of publication, with comparative rates for the same period of the three preceding calendar years. Maternal mortality rates are included and fortunately the August report begins to cite the rates per 1,000 live babies rather than per 100,000 population as did the first tables, and statements that are made by the various states should serve as a stimulant for public health officials and obstetricians in their joint efforts to reduce the maternal death rate. To illustrate, Iowa, from January to May of this year shows a rate of 7.4 compared with the much too high rates of 6.7 and 6.6 for the same period of the two preceding years, and Kansas has a rate of 9.2 compared with 7.1 and 8.8 of the previous years, with the state of New York, exclusive of New York City, showing rates of 6.1, 6.1, 7.5, and 6.6 for the same period in 1930 and the three preceding years.

Dr. Henry Bixby Hemenway, Medical Registrar of the Illinois State Department of Health, at the annual meeting of the American Public Health Association last October, strongly renewed the plea for the method of using the divisor in obtaining rates, not live babies alone but live and stillbirths. For many years the New York State Health Department has figured maternal death rates as per 1,000 live and stillbirths. The Bureau of the Census, on the other hand, uses as the divisor the

number of live births in figuring rates for the registration area. Dr. Hemenway presents a strong argument for his preference of the divisor including both still and live births in his statements that practically no death included under the cause, *Accidents of Pregnancy* (No. 143), is connected with a living birth, that deaths from eclampsia, septicemia, and a goodly proportion of other maternal deaths are associated with stillbirths. With the true maternal death rate risk properly based on the total number of pregnancies, which is not accurately obtainable under the general report system in any state or country, the next closest total, that of still and live births, would seem the logical divisor. The variation in reporting of stillbirths in respect to months of gestation vitiates to a certain degree, however, the stillbirth count. Canada has recently published a study of maternal death rates figured with three divisors, live births only, still and live births, and total confinements. The three rates were 5.78, 5.58, and 5.65 respectively. State rates figured by Dr. Hemenway show a similarly slight variation. The adoption of the most accurately registered divisor for the standard would, therefore, seem to be the course indicated, rather than a struggle to register total confinements.

A number of special studies have been undertaken during the year to determine why the high maternal death rate continues despite the many efforts which have been made to reduce it.

The New York Academy of Medicine is carrying on a three-year study of the cause of death of every woman who dies during or after pregnancy and at child-birth. This study is very exhaustive and will probably bring out more definite information than any of the preceding studies of a like character. However, no results are yet available.

In Wisconsin, a special study was made by Calvert of the maternal deaths, 766 in number, in the years 1927 and 1928. Of these deaths, 632 were due primarily to puerperal causes and 60 per cent followed surgical procedures with 20 per cent of all of the operations being cesarean sections, while 13 per cent of all of the maternal deaths followed cesarean sections. One-third of the women were primipara and 45 per cent of the group were under thirty years of age. Septicemia was the most frequent cause of death and included one-third of all of the deaths. Eclampsia came second with one-fourth of all of the deaths. Of the septic deaths 35.3 per cent followed septic abortions, criminal or self-induced. Forty-four per cent of these women had no prenatal care.

For two years past the New York State Department of Health has been endeavoring to tabulate the answers on 697 questionnaires filled in by physicians as to the cause of maternal deaths given in greater detail than on death certificates. One is startled to read that of these cases only partially studied, only thirteen women had been in the hands of a physician during the whole nine-months' period of gestation, while 50 per cent were in the hands of a physician for one week or less. Four hundred and eight answers were given concerning prenatal care, of which 65 per cent had noted such care while 41 per cent of the total did not answer this question at all. The reports from the State Health Department indicate that these tabulations will soon be completed.

Sir Arthur Newsholme makes a very interesting report of the maternal deaths in the London East Side Maternity Hospital, in which he has studied the maternal deaths for the years 1884-1928 inclusive.

In the year 1927-1928 this hospital, with a bed capacity of 56, had 2,517 confinements in the hospital, while 1,608 confinements were cared for by the staff members in the patients' homes. There were three maternal deaths in the hospital group while there were no deaths at all in the patients' homes. This may have been due to the fact that the more difficult cases were taken to the hospital, rather than that better technic was followed in the homes. Sir Arthur compares this rate of 1.19 per 1,000 live births for the institution with that of 3.09 in the entire

metropolitan area, and decides that there must have been better work in the institution, because, while the hospital cases were mostly those of births after the seventh or eighth months of pregnancy, those in the metropolitan area covered all stages of pregnancy. However, this will not explain the difference, as it is well known that the maternal deaths before the seventh month of gestation are small in number. When this discrepancy is estimated, the fact still remains that the maternal death rate in the cases in the institutions is only one-third that of the entire urban area and one-third as high as that of "Poplar," the neighborhood from which most of the patients come. There is a somewhat similar condition in relation to the death rate for stillbirth and live births, both of which are lower than those for the entire area. In 1928, 43 per cent of the mothers who died were primipara. Supervision in this hospital begins in the sixth or seventh month and is continuous thereafter. The women come regularly for examination and nurses pay weekly visits to the homes to see that instructions and laboratory examinations are carried out. This careful supervision during pregnancy is evidenced by the fact that there has been no death from eclampsia since 1919, although 20,000 women have been delivered and only one slight case of eclampsia has developed in the last 8,000 patients. In England, of course, a very large number of the deliveries are carried on by highly trained nurse midwives who have physicians always on call. A record like the one above quoted certainly makes one pause and realize what can be done. However, in our opinion some other elements must enter into causes of eclampsia, because eclampsia seems to occur in waves; in some years we see many cases even though patients have care during pregnancy, while in other years there are not any.

Louis Dublin gives a preliminary report of a study which was made jointly by a Maternity Center Association and the Metropolitan Life Insurance Company. (See this Journal, December issue, 1930.)

A number of committees representing this Association, the American Medical Association, and kindred agencies are working on the practical problem of increasing the efficiency of collegiate training in obstetrics. There seems to be a general consensus of opinion that more practical work in obstetrics is essential and that the number of hours spent in classroom and clinical work must more nearly approximate those spent on medicine and surgery. Apparently only progress reports have been made during the current year.

President Hoover's White House Conference should bring forth the very last word in relation to the whole subject of maternal welfare, because in its Division on Children's Health, an investigation is being made by the questionnaire method. The questionnaire has been widely circulated and is sufficiently intensive to furnish a variety of facts if the individual doctor takes time to study and answer the questions fully. This information will not be available before the middle of November.

Dr. L. A. Calkins of your own committee reports that a nine weeks' postgraduate course in obstetrics, in East Oklahoma was given this year, during May and June, and that he gave a similar nine weeks' course in western Kansas during June and July. The program for these circuit courses in Kansas and Oklahoma is to be carried out for the next four or five years, eventually covering the entire states. Dr. Calkins suggests that it would be well for the Association to urge that obstetric teaching should be included in training courses now being carried on in Wisconsin, North Carolina, and Georgia. In this connection it may be stated that the Federal Children's Bureau during the last year has sent Dr. McCord of Atlanta to conduct a series of institutes on maternity care for the rural physicians of Georgia.

Another plan considered in New York City is that for developing a center for training in midwifery. This course in the beginning is to be for graduate nurses

who will be fitted for the practice of midwifery in rural communities and as mid-wife supervisors. This activity is to be in charge of a committee for the Promotion and Standardization of Midwifery, of which Dr. George Kosmak, one of our Fellows, is among the incorporators.

It would seem that some cognizance of the birth control movement which is growing steadily in popularity could well be taken up by this Association. A recent volume on *Seventy Birth Control Clinics* by Caroline Hadley Robinson, published under the auspices of the National Committee on Maternal Health, with an introduction by Dr. Robert Latou Dickenson, raises the whole subject out of the realm of the sensational or emotional, with which it has so often been associated, and places it on the plane of a rational, scientific undertaking. With such men as Dr. Kosmak and Dr. Dickinson on the National Committee, as well as numerous others, it would seem that this Association could afford to have a definite policy in relation to the whole movement which would be of great assistance. There is little doubt today that a properly run birth control clinic, under the guidance of the best medical men in a given community would be an asset in many ways.

A wonderful opportunity for education on maternal welfare could be obtained through the use of the Parent-Teachers' Association groups, throughout the country, by the members of this Association. This national organization reaches into the very small places and is organizing more study groups in places of all sizes. A request to place the discussion of this subject on these thousands of programs, as sent out by them on the subject of maternal welfare, if conducted by competent men, would bring about an enormous amount of publicity which would reach mothers of all ages. These women are rapidly becoming intelligently articulate in their communities and care during pregnancy could be very materially increased by such a plan.

An interesting side light has been thrown several times lately upon the question of maternal welfare by the invasion of this field by the lay woman, through the medium of the popular magazine. One such discussion by Constance L. Todd, published in the *Ladies' Home Journal*, gives a history of the growth of the use of the Gwathmey method of synergistic analgesia. This is not a superficial article written by a tyro but is the work of a woman who has been so engrossed in the idea of relieving women of the pains of childbirth that she has gone into hospitals all over the country, talked with obstetricians, dug into hospital files, and is about to publish a book upon the results of her studies. When one considers the enormous circulation which this magazine enjoys, together with the fact that the author reports some 5800 cases in which the method has been used in the New York Lying-In Hospital, in which 85 per cent of the patients had almost complete relief from pain, as well as the fact that after quoting experiences of a similar type from Chicago, Madison, Cincinnati, Pittsburgh, and Philadelphia, together with Ottawa and Montreal, she concludes the article with a challenge to women to demand that their obstetricians look into the matter and see if it is not possible to give them well, live babies after normal deliveries without surgical interference, and practically without pain, one realizes such a woman may have a great deal of influence, good or bad as the case may be.

Dr. Helen Mac Murchy reports that the educational work for maternal welfare in Canada has been carried further by the publication of a new edition of the *Canadian Mother's Book* which contains additional educational material. This little booklet goes to mothers throughout the Dominion and carries the message of Canada's maternal and infant death rates. The material is set forth with great skill because of its simplicity and practical application while, at the same time, it tells the statistical story. The interest in the whole subject is reported to have increased throughout this year.

RECOMMENDATIONS

A. That the Committee on Maternal Welfare go on record as urging the Association to use its influence in helping to promote the collection and standardization of vital statistics to the end that comparable and specific maternal death rates shall be available with the greatest possible accuracy as to the cause of death, because of the well-known absence of accurate detailed information upon these death certificates.

B. The following recommendations are from Dr. Cooke, a member of your committee.

1. A concerted effort to train the student to proper obstetric thinking and conscience in a way which will endure after his graduation; this to be accomplished by giving an adequate amount of time to obstetric teaching, realizing that in general practice a knowledge of obstetrics is more necessary than a knowledge of surgery and equally necessary with a knowledge of medicine.

2. In teaching where time is limited, such as in the schools which train general practitioners primarily, concentrated attention should be given to the essentials, and particularly to thorough, supervised mannikin practice.

3. The clinical teaching of obstetrics should be real teaching, and not merely the half-supervised conduct of more or less normal cases, which is customary at present. A competent instructor and students should be with the patient from the onset of labor until its termination. Prenatal and postnatal care should be thoroughly drilled into students in the out-patient departments. It would be preferable to have each patient handled by the same student from her first visit to the prenatal clinic until she is discharged from the follow-up service.

4. Careful study of hospital conditions in regard to obstetrics should be made. The present survey being carried out by the White House Conference is excellent, but it seems to me not to cover certain important points, of which I may mention the following:

a) In the questionnaire regarding causes of maternal and fetal death, there may be quite an error in the interpretation of the statistics obtained, through the requirement that fetal deaths be listed as following various specified operations; whereas, in fact (certainly this is true in our hospitals) a number of fetal deaths occur from causes not at all connected with the method of delivery.

b) In the survey it would have been very valuable to ascertain just what difference, if any, existed between the practice of teachers of and specialists in obstetrics as compared with that of other practitioners in the same hospital. In every hospital survey so far published, and in several surveys which I have made myself, this difference has been extremely marked.

5. The effort should be continued (although I am afraid this will prove as futile in the future as in the past) to educate the average practitioner in the proper conduct of obstetric practice, through the reading of papers, etc.

6. It is my opinion that conditions would be wonderfully improved if the system of medical education were rationally altered to meet changed conditions as regards specialization at the present time. My idea is quite similar to that which has been put into effect by the Mayo Foundation of Minnesota:

a) That undergraduate students should be thoroughly trained in those subjects which are primarily of value to the general practitioner: medicine, obstetrics, minor surgery and gynecology, and the early diagnosis of major gynecologic, surgical, and other diseases. On the completion of this course and a year's rotating internship, the student may be given the degree of M.D., and be legally qualified as a general practitioner, with a definite legal limitation as to the types of major work which he might practice (due allowance being made for emergencies).

b) The holder of the M.D. degree would be eligible for a postgraduate course of at least three years, in which he would be thoroughly drilled in the minutiae of the

speciality which he elected, from both the theoretic and the practical point of view. Thorough training in pathology and research methods should be given during this course. This course would best be given while the student served as a resident in his specialty in the teaching hospital. On the completion of this course he would receive some such degree as Master of Science in Obstetrics, Surgery, etc., and would be legally qualified as a specialist.

Such a plan would provide the public with a general practitioner much better trained for the character of work which he would be capable of performing, and would insure that a specialist really was deserving of the name, having had at least a barely adequate training for the purpose.

IRVING W. POTTER, M.D., Chairman.

WILLARD R. COOKE, M.D.

L. A. CALKINS, M.D.

Lane-Roberts, C. S.: **Abdominal Pain in Pregnancy.** Lancet 2: 1288, 1928.

The author states that there may be continuous or intermittent abdominal pain in pregnancy. Not infrequently positive physical signs are absent. The severity may vary from a mild discomfort to a marked distress. Abdominal supports may relieve or may aggravate the condition. Gradual stretching of the uterus, stretching of the round ligaments, constipation, flatulence, toxemia, and fetal movements are some of the causes of pain.

The commoner organic causes are divided into three groups in which the condition is confined: (1) to the uterus; (2) to the adnexa, (3) and to associated conditions. Undue stretching of the uterus as in hydramnios, multiple pregnancies, and hydatidiform mole are very likely to produce pain. All types of fibromyomas with their possible changes and mechanical interferences may distress the patient. Likewise, concealed hemorrhage and rupture of the uterus manifest themselves by pain.

Ectopic pregnancy most commonly produces pain at the time of rupture. "Salpingitis and salphingo-oophoritis rarely light up in pregnancy." Ovarian tumors generally produce distress because of pressure, torsion, or degeneration.

Of the associated conditions pyelitis, acute appendicitis, intestinal obstruction, retroverted uterus, gall bladder complications, pneumonia, caleuli, and suppurative pelvic peritonitis are possible causes of abdominal pain.

H. C. HESSELTINE.

Item

American Board of Obstetricians and Gynecologists

Formally organized in September, 1930, the Board has now issued certificates to the group of physicians whose names are published herewith. The first examination for candidates is to be held March 14, 1931. The men whose names appear below have been granted certification upon the basis of their attainments. This distinguished list is an index therefore of the importance which the functions of the Board have assumed in the minds of some of the eminent obstetricians and gynecologists of this country and Canada since each man whose name appears on this list was considered individually by the entire Board and had made personal application for certification. Undoubtedly there are many others whom the Committee on Credentials would recommend to the Board for classification in Group I for a certificate to be granted without examination and the Secretary, Doctor Paul Titus, 1015 Highland Building, Pittsburgh, Pennsylvania, will be glad to receive applications from these men. The JOURNAL will publish the accessions to the list of certified physicians as these are received from the Secretary.

ADAIR, FRED L.	CHICAGO, ILLINOIS
AINLEY, FRANK C.	LOS ANGELES, CALIF.
ANSPACH, BROOKE M.	PHILADELPHIA, PA.
AYRES, DANIEL R.	NEW YORK CITY
BAER, JOSEPH L.	CHICAGO, ILLINOIS
BARRY, LEE W.	ST. PAUL, MINN.
BILL, A. H.	CLEVELAND, OHIO
BISHOP, ELLIOT	BROOKLYN, N. Y.
BLAND, P. B.	PHILADELPHIA, PA.
BLOOMFIELD, J. H.	CHICAGO, ILLINOIS
BLOSS, J. R.	HUNTINGTON, WEST VA.
CALDWELL, W. E.	NEW YORK CITY
CALKINS, L. A.	KANSAS CITY, KANSAS
CARY, EUGENE	CHICAGO, ILLINOIS
CHALFANT, SIDNEY A.	PITTSBURGH, PA.
CLELAND, F. A.	TORONTO, CANADA
COOKE, W. R.	GALVESTON, TEXAS
CORSCADEN, J. A.	NEW YORK CITY
CREADICK, A. N.	NEW HAVEN, CONN.
CUMMINGS, H. H.	ANN ARBOR, MICHIGAN
CHERRY, THOMAS H.	NEW YORK CITY

DANFORTH, W. C.	EVANSTON, ILLINOIS
DANNREUTHER, WALTER T.	NEW YORK CITY
DAVIS, C. H.	MILWAUKEE, WIS.
DELEE, J. B.	CHICAGO, ILLINOIS
DENORMANDIE, R. L.	BOSTON, MASS.
EHRENFEST, HUGO	ST. LOUIS, MO.
EMGE, L. A.	SAN FRANCISCO, CALIF.
FALLS, F. H.	CHICAGO, ILLINOIS
FARRAR, LILLIAN K. P.	NEW YORK CITY
FINDLEY, PALMER	OMAHA, NEB.
FISHER, JOHN M.	PHILADELPHIA, PA.
FOULKROD, COLLIN	PHILADELPHIA, PA.
FULKERSON, L. L.	NEW YORK CITY
FRANK, R. T.	NEW YORK CITY
FRANKENTHAL, LESTER E.	CHICAGO, ILLINOIS
GALLOWAY, C. E.	EVANSTON, ILLINOIS
GARNETT, A. Y. P.	WASHINGTON, D. C.
GEIST, SAMUEL H.	NEW YORK CITY
GILLIS, R. A. D.	PITTSBURGH, PA.
GOFF, BYRON H.	NEW YORK CITY
GOLDSBOROUGH, F. C.	BUFFALO, N. Y.
GORDON, C. A.	BROOKLYN, N. Y.
GRAD, HERMAN	NEW YORK CITY
GREENHILL, JACOB P.	CHICAGO, ILLINOIS
HAMMOND, FRANK C.	PHILADELPHIA, PA.
HAMILTON, BUFORD G.	KANSAS CITY, MO.
HANNAH, C. R.	DALLAS, TEXAS
HARPER, PAUL T.	ALBANY, N. Y.
HEALY, WILLIAM P.	NEW YORK CITY
HENDRY, W. B.	TORONTO, CANADA
HORNER, DAVID A.	CHICAGO, ILLINOIS
HUMPSTONE, O. P.	BROOKLYN, N. Y.
ILL, E. J.	NEWARK, N. J.
INGRAHAM, C. B.	DENVER, COLO.
IRVING, FRED. C.	BOSTON, MASS.
JACOBY, ADOLPH	NEW YORK CITY
JELLINGHAUS, FREDERICK C.	NEW YORK CITY
JEWETT, W. A.	BROOKLYN, N. Y.

KAHN, I. W.	NEW YORK CITY
KAMPERMAN, G. L.	DETROIT, MICHIGAN
KANTER, A. E.	CHICAGO, ILLINOIS
KEENE, FLOYD E.	PHILADELPHIA, PA.
KELLOGG, F. S.	BOSTON, MASS.
KING, J. E.	BUFFALO, N. Y.
KOSMAK, GEORGE W.	NEW YORK CITY
KREBS, OTTO S.	ST. LOUIS, MO.
LACKNER, JULIUS	CHICAGO, ILLINOIS
LA VAKE, R. T.	MINNEAPOLIS, MINN.
LEIGHTON, A. P.	PORTLAND, MAINE
LITTLE, H. M.	MONTREAL, CANADA
LITZENBERG, JENNINGS C.	MINNEAPOLIS, MINN.
LONGAKER, DANIEL	PHILADELPHIA, PA.
LYNCH, FRANK W.	SAN FRANCISCO, CALIF.
LYON, E. C., JR.	NEW YORK CITY
MALAND, C. O.	MINNEAPOLIS, MINN.
MATTHEWS, H. B.	BROOKLYN, N. Y.
MATHIEU, ALBERT	PORTLAND, OREGON
MAZER, CHARLES	PHILADELPHIA, PA.
McCORD, J. R.	ATLANTA, GA.
McCUSKER, C. J.	PORTLAND, OREGON
McNEILE, L. G.	LOS ANGELES, CALIF.
McPHERSON, ROSS	NEW YORK CITY
MENDENHALL, A. M.	INDIANAPOLIS, IND.
MILLER, C. JEFF	NEW ORLEANS, LA.
MILLER, HILLIARD E.	NEW ORLEANS, LA.
MILLER, JAMES R.	HARTFORD, CONN.
MUSSEY, R. D.	ROCHESTER, MINN.
MOENCH, G. H.	NEW YORK CITY
NEWELL, Q. U.	ST. LOUIS, MO.
NORRIS, CHARLES C.	PHILADELPHIA, PA.
NOVAK, EMIL	BALTIMORE, MD.
PARKE, WM. E.	PHILADELPHIA, PA.
PETERSON, REUBEN	ANN ARBOR, MICHIGAN
PHANEUF, LOUIS E.	BOSTON, MASS.
PLASS, E. D.	IOWA CITY, IOWA
POLAK, J. O.	BROOKLYN, N. Y.
QUIGLEY, J. K.	ROCHESTER, N. Y.

REED, CHARLES B.	CHICAGO, ILLINOIS
RONGY, A. J.	NEW YORK CITY
ROTHRACK, J. L.	ST. PAUL, MINN.
ROWLAND, J. M. H.	BALTIMORE, MD.
ROYSTON, GRANDISON D.	ST. LOUIS, MO.
RUBIN, I. C.	NEW YORK CITY
RUCKER, M. P.	RICHMOND, VA.
RYDER, GEORGE H.	NEW YORK CITY
SCHMITZ, HENRY	CHICAGO, ILLINOIS
SCHOENACK, H. W.	SYRACUSE, N. Y.
SCOTT, R. A.	EVANSTON, ILLINOIS
SCHUMANN, E. A.	PHILADELPHIA, PA.
SCHWARZ, O. H.	ST. LOUIS, MO.
SEELEY, W. F.	DETROIT, MICHIGAN
SIMON, LUDWIG S.	CHICAGO, ILLINOIS
SLEMONS, J. M.	LOS ANGELES, CALIF.
SMEAD, L. F.	TOLEDO, OHIO
STEIN, ARTHUR	NEW YORK CITY
STEIN, IRVING F.	CHICAGO, ILLINOIS
STEPHENSON, H. A.	SAN FRANCISCO, CALIF.
TATE, M. A.	CINCINNATI, OHIO
TAUSSIG, F. J.	ST. LOUIS, MO.
TITUS, PAUL	PITTSBURGH, PA.
TOOMBS, PERCY W.	MEMPHIS, TENN.
VAN ETEN, R. C.	NEW YORK CITY
VAUX, NORRIS W.	PHILADELPHIA, PA.
WARD, GEORGE G.	NEW YORK CITY
WARD, WILBUR	NEW YORK CITY
WATSON, B. P.	NEW YORK CITY
WELTON, T. S.	BROOKLYN, N. Y.
WILLIAMS, J. WHITRIDGE	BALTIMORE, MD.
WILLIAMSON, HERVEY C.	NEW YORK CITY
WING, LUCIUS A.	NEW YORK CITY
WILLIAMS, PHILIP F.	PHILADELPHIA, PA.
YATES, H. W.	DETROIT, MICHIGAN

Books Received

Books received are acknowledged in this column, and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for more extensive review in the interests of our readers and as space permits. Book Reviews will be published every two months if available. This department will be conducted by Dr. Robert T. Frank aided by several associates.

BEHAVIOR OF THE NEWBORN INFANT. By Karl Chapman Pratt, Amalie Kraushaar Nelson, and Kuo Hua Sun. The Ohio State University Press, Columbus, 1930.

CHILD ADJUSTMENT, in relation to growth and development. By Annie Dolman Inskeep, Ph.D. D. Appleton & Co., New York, 1930.

FARM CHILDREN. By Bird T. Baldwin, Eva Abigail Filmore and Lora Hadley, of the Iowa Child Welfare Research Station. D. Appleton & Co., New York, 1930.

THE CREED OF A BIOLOGIST. By Alfred Scott Warthin, professor of pathology, and director of the pathologic laboratories in the University of Michigan, Ann Arbor. Paul B. Hoeber, New York, 1930.

IDEAL MARRIAGE. Its Physiology and Technique. By Th. H. Van de Velde, formerly director of the gynecologic clinic in Haarlem. Translated by Stella Browne. Covici-Friede, Publishers, New York, 1930.

STOECKEL'S HANDBUCH DER GYNAEKOLOGIE. Dritte, neubearbeitete und erweiterte Auflage. Fuenfter Band, zweite Haelfte. Die Erkrankungen der Scheide, bearbeitet von Professor Dr. Ludwig Nuernberger, Universitaetsfrauenklinik in Halle. Mit 271 zum Teil farbigen Abbildungen im Text. Verlag von J. F. Bergmann, Muenchens, 1930.

MEDICAL REPORT FOR THE YEAR 1929. Glasgow Royal Maternity and Women's Hospital, Glasgow, 1930.

THERAPIE DER KOMPLIZIERTEN SCHWANGERSCHAFT. Von Professor Dr. Th. von Jaschke, Universitaetsfrauenklinik Giessen. Georg Thieme, Leipzig, 1930.

BLUTUNGEN UND FLUOR. Von Professor Dr. Hans Runge, Universitaetsfrauenklinik in Kiel. Mit 18 Abbildungen. Verlag von Theodor Steinkopff, Leipzig, 1930.

METHODS AND PROBLEMS OF MEDICAL EDUCATION. Eighteenth Series. The Rockefeller Foundation, New York, 1930.

TEXTBOOK OF GYNECOLOGY. By Arthur Hale Curtis, professor and head of department of obstetrics and gynecology, Northwestern University Medical School, etc., etc. With 222 original illustrations. W. B. Saunders Company, Philadelphia, 1930.